Prague - Project - Portfolio - Planning - Platform

for Renewable Energy Sources

Self-Powered Community Business Knowledge Transfer

SPC Concept
(Case example)

The SPC Concept reflects the need to gain practical experiences in socio-economic and technical aspects of global transformations, e.g. structural interventions in Europe, population limits in Asia, and the Millennium Villages program in Africa. Seemingly unrelated activities have a common task: to apply the know-how and to open access to employment, food production, health care and education for all.

The SPC Concept offers a counterweight to direct foreign direct investment into infrastructure projects in developing countries. What does it mean? It means, above all, implementation of business model to local (provincial) project management, starting with financial control practices, financial independence, and sustainability derived from Public Private Partnership (PPP).

Key actors in implementation of the SPC Concept implementation are local governments, local private sector, and donors (banks, funds, individuals). SPC Concept, using PPP model, implementation selected drivers of the regional infrastructure development and it is using locally available wealth of renewable sources to benefit the entire community.

SPC Concept is focused on improvement of Quality of Life (QL) and solutions of impacts of Climate Change (CC) in a given region of the world. The Case Example presents Pilot Project for regions located mostly in tropical and sub-tropical areas. It applies PPP mechanism in capital investments into infrastructure projects at local levels. Pilot Project is proposed being prepared and implemented by the SPC Utility.

Content:

1. General Goals

1. Access to electricity is a basic human right. This thesis is presented with a link to the UN initiative - Sustainable Energy 4 All

2. Billing for electricity stimulates growth in financial literacy (e.g. for staff of the central and local governments; middle, small, and micro entrepreneurs; households, and others)

3. The Pilot Project addresses the universal needs of almost 4/5 of the world population which are waiting for a reliable, 24/7 accesses to electricity. It represents a substantial market and offers answer to investors' question: Where can one invest, safety and securely with a clear value position?

The SPC Concept works with the following three drivers: decentralized electrification (e), rainwater (w) and biomass (m) management applied to specific projects in a specific territory. Synergy effects of these drivers are activated by investment in a territory administrated by a Local Government Unit (LGU) and managed and controlled by SPC Utility.

The SPC Utility is an organizational unit founded and operated by key actors in a territory (region, province) to implement the SPC Concept.

The SPC Concept is focused on households and entrepreneurs of a province. It guides them to self-motivation and participation in a public private partnership.

The SPC Concept can be expressed in the following general formula:

SPC Concept => (QL & CC) => (e) & (w & m) => SPC Utility

The presentation follows up on the Case Story prepared for "Region in Development" and it is based on inputs generated from cooperation with our Philippine partners, mostly from the Bicol Region and the Sorsogon Province.

2. Technique of Life and Education

Globalization uncovers cultural roots of communities, and confronts their population with impacts of fast changes and uncertain future. We can see how one community might be using knife and fork and another one chopsticks and at the same tome members from both communities might be driving the same kind of a car or use the same brand of a tablet.

In the past, communities differentiated themselves with their particular techniques of life, the way they ate, what housing they had, how they worked. Today, technologies erase these differences, people connect with other more easily, and they communicate; yet differences between them often persist. Cultural differences are disappearing, social differences are deepening, and economic differences are polarizing.

Although people in communities might be conservative they do not prevent changes in established or traditional techniques of life. They often like new technologies but they have a problem as how to them. It is not enough to buy a technology, one has to master it, learn how to earn money by using it and how to take care of it and maintain it so it can be sustainable and even expanded upon in a future.

Technology is a live product. Technology of life is what gives daily rhythm to trade, production, services and work in cities and villages. Existing administration, legislation, political preferences or educational level of the population are separate segments that create real environment for people living in a community.

The Case Example is working with two systemic preconditions that a community should meet as long as it wishes to adopt new technologies and change its technique of life:

1. (Defined by the objective): To assure access to electricity and to start enterprises.
2. (Defined by the journey toward such goal itself): To learn it.

3. Why the Philippines

The Philippines are a country of natural islands (about 7,000 in total), comprised of 17 regions, 80 provinces, 140 cities, 1,500 municipalities, and 42,000 barangays. Its geography of natural islands predestinates the country for implementation of the first SPC Concept Pilot Project.

The Philippines is the 43rd (2011) largest economy in the world, predicted to be 14th in 2050; economic growth 6.6% per annum (2012), 2014 prediction standing at 6-7%. The Philippines stock market now has the world's fifth best-performing index; inflation is below 3%, unemployment rate 6.8 % (2012). As of January 2013, foreign reserves have increased to US$ $86 billion.

The Philippines enjoy positive banks' references (e.g. Hong Kong and Shanghai Banking Corporation), and the Philippines is investing almost $300 million at annual rate of $58.7 million into rural electrification projects. Investments starting from a low base, and local government, private sector and consumers group have a significant volume of potential rural electrification projects ahead of them. The past rural privatization efforts have seen mixed results. The Philippines's Renewable Energy Act of 2008 is the best and the most comprehensive renewable energy law in South-East Asia.

Status of cooperation

Official contacts were opened at the Power Trends 2011 in Manila and continued in following years on both central and regional levels. The SPC Concept and its development stages were introduced and discussed at central level (Department of Energy, Department of Science and Technologies, Department of Environment and National Resources, the Climate Commission) and at contacts assisted by both Embassies in Manila and Prague. Inputs are based on 5PforRES Letters of Intends (LOIs) with Mapua Institute of Technology and with the Asia Pacific Resource Recovery Reuse and Development Co. (APRRRDC), both in Manila.

The first data collection at a province level was performed from Master Plan and Citizen's Charter of the Laguna De Bay, a lake located close to Manila. 5PforRES prepared an offer for cooperation in 2012. The next opportunity was the 5PforRES offer to the Aurora Pacific Economic Zone (APEC) in the municipality of Casiguran in the Aurora Province.

The opportunity to more extensive data collection was initiated by the offer to finance the 1MWp solar power plants in the Santa Magdalena municipality and from cooperation with local partners form the Bicol Region, mostly from the Sorsogon Province (the cooperation with the province based on the 2013 LOI).

Investment in the decentralized electrification (e) together with investment in projects of retention water management (w) and biomass management (m) is a real options to bring more lights to urban, peri-urban and rural areas not only in the Philippines.

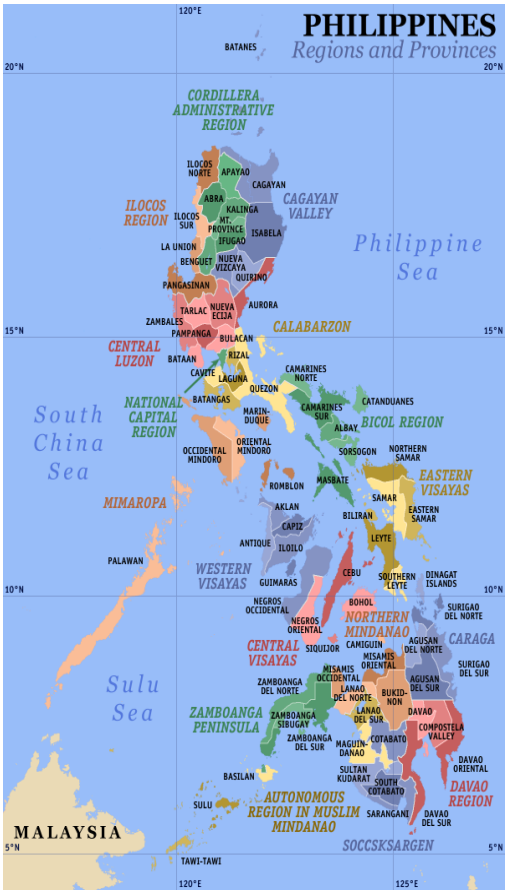
4. Public Administration

Regional and provinces characteristic were gained from publicly available sources. The aim of this data snap is to present a general information about administrative system and policy structure of a country that intends to implement the SPC Concept, and to define a "virtual example" of a province for work on financial model of business concept proposal for specific clients.

Bicol Region

The region has 7 cities, 107 municipalities, 3,400 barangays; 5.1 million inhabitants (2007) living on 17,600 km^2 (population density 265 inhabitants per km^2). Number of households is 890,000 with 5 people per household on average (2000).

Table 1: Characteristics of the Bicol region



BICOL REGION & PROVICES Table 1	Number of Cities	Number of Municipalities	Number of Barangays	Population (2010)	Area km^2
Albay	3	15	720	1,233,000	2,552
Camarines Norte	0	12	282	542,000	2,320
Camarines Sur	2	35	1063	1,822,000	5,481
Catanduanes	0	11	315	246,100	1,511
Masbale	1	20	650	834,800	4,047
Sorsogon	1	14	541	740,700	2,141

Sorsogon Province

The province has one city (Sorsogon City), 14 municipalities, 541 barangays; 709,000 inhabitants (2007); Population living on 2,141 km^2 (population density of 331 per km^2). Number of households is 125,000 with 5.2 persons per household on average (2000).

Other characteristics were analyzed from the Sorsogon and Camarines Norte provinces trough personal research and from publicly available sources.

Table 2: Characteristics of the Sorsogon province and its municipals (barangays) characteristics

No higher resolution available.

SORSOGON: PROVINCE & MUNICIPALITIES Table 2	Legislative Districts	Incomes Class (2007)	Number of Barangays	Population (2010)	Area km^2
Casiguran	1	4th	25	30,995	87
Castilla	1	3rd	34	52,903	186
Donsol	1	3rd	51	47,563	156
Magallanes	1	3rd	34	35,443	150
Pilar	1	1st	49	68,245	248
Sorsogon City	1	3rd	64	155,144	276
Barcelona	2	5th	25	20,340	61
Bulan	2	1st	63	93,943	196
Bulusan	2	4th	24	22,089	96
Gubat	2	1st	42	57,327	134
Irosin	2	2nd	28	51,777	149
Juban	2	4th	25	30.335	121
Matnok	2	3rd	40	37,641	162
Prieto Diaz	2	5th	23	20,478	49
Santa Magdalena	2	5th	14	16,520	43

Municipalities are classified by into income using the codes of the Philippines Statistical Authority. Barangays. Municipalities will be key partners to SPC Utility, along with households and micro/small/ medium enterprises in given communities.

In 2000-2003, Sorsogon Province was classified as Class 2, with the average annual income of p339.4m ($7.34m), and Sorsogon City as Class 3 with the average annual income of p240-320m ($5.5-7.3m).

Our visits to Bicol region and cooperative efforts with Sorsogon province and municipality Santa Magdalena served as a foundation for assessment of opportunities for cooperation with public sector in the Philippines. For further work on the SPC Concept implementation we decided to work with a sample province. It will be used for preparation of financial model of the pilot project.

LGUs in the Sorsogon Province: one LGU of the Province, one LGU of the Sorsogon City, 14 LGUs of Municipalities, and 348 of Barangays.

5. Sample of a Province

The sample province is represented by one city, 20 municipalities, 500 barangays; 1.0 million inhabitants living on 2,500 km^2 (population density 400 per km^2). Three extra items were included in key characteristics of the sample province:

- The number of end users: 250,000 in total. They are split into 200,000 households and 50,000 of other units (micro, mini and small workshops, schools, medical centers).

- Forest area (50% of the overall area of a province): we assume that the province has1, 250 km^2 of coconut and bamboo forests (including highways, roads and pathways). For the financial model we will not distinguish existing and new forests or replanting of existing forests. Fields for growing rice, corn and others crops - located outside of a forest - represent additional 1, 200 km^2. Other areas, about 50,000 km^2, are used for housing and workshops of various small industrial sectors.

- Mayors and barangay Chairmen: Risks related to public administration services (impacts of public pressures, changing voter preferences affecting readiness of politicians to commit themselves to long-term projects; opportunities for corruption). Issues of financial control, budgetary discipline, compliance with license commitments (e.g. given to the SPC Utility for 30 years). Mayors and barangay's Chairmen are responsible for socio-economic development will be trained in effective mobilization and sustainability of support for the project (e.g. through Citizen Charter).

Table 3: Key characteristics of a sample

SAMPLE OF PROVINCE	No. of Cities	No. of Municipalities	No. of Barangays	No. of Inhabitants	Area (km^2)	Forest Area (km^2)	Density (per. per km^2)	No. of Households	No. of Mayors	No. of Chairmen
				1,000,000	2,500	1,250	400	200, 000	21	
City	1	-	-	150,000	-	-	500	30,000	1	-
Municipalities	-	20	-	42,500	-	-	386	8,500	20	-
Barangays	-	-	500	2000	-	-	-	400	-	500

6. Revenues

Both the public administrations capacity and the total local purchasing power are the most important indicators of a successful SPC project. We are using four key indicators (public budget, personal income, social stability, and household's trends).

Financial resources for public budget

An LGU can either earn from local sources (taxes, duties and other fees) or receive a share from the National Government's Incomes (Internal Revenue Allotment-IRA, grants, debt services etc.). IRA is LGU's lifeblood.

LGUs assess the market value of real properties (buildings, machineries, lands); determinate the "assessed value" of current market price of real property (residential, commercial, industrial); tax the assess value of real properties (for province is a real property tax 1%, for cities and municipalities up to 2%); revise schedule of market value of real properties every three years.

IRA comes from the National Government's Revenue (from mining tax, forestry and fisheries fee, royalties, and other charges). IRA represents 40% of the total National Government's Incomes. For example: for 2013 it was projected p500 ($11.4) billion for all LGUs in the Philippines from the total portion of IRA in a value p1.25 trillion ($30 billion).

Share of LGUs from the National Government's Revenue is 34% for a province, 23% for a city, 23% for a municipality, and 20% for a barangay. Every 40% of p100 of the National Government's Revenue is split among LGUs by this rule: p9 for province, p9 for city, p14 for municipality, p8 for barangay.

Amount in a year is based on the national government's internal revenue collection 3 years before.

Income Classification of Provinces and Cities

Provinces and cities, except Manila and Quezon City, are divided into five main classes according to their average annual income over the last four fiscal years:

1st Class: Provinces and cities which have received – on average - three million pesos or more per annum;

2nd Class: Provinces and cities have received 1,500,000 pesos or more but less than 3,000,000 pesos per annum;

3rd Class: More than 1,000,000 pesos but less than 1,500,000 pesos a year;

4th Class: More than 500,000 pesos but less than 1,000,000 pesos a year; and

5th Class: Less than 500,000 pesos a year.

Personal income

Low Incomes Category (LIC) is regulated by the government and is set forth for regions, e.g. the Bicol Region (2012) – p247 ($5.6).

Middle Income Category (MIC) is for employee earning p10-30th. ($230-700) per month and High Income Category (HIC) is split into the Average Level - up to p50, 000 ($1170) and the Maximum Level - up to p550, 000 ($12,850).

For the last 10 years, statistical differences between HIC and the rest of the society have been narrowing.

Quality of life (QL) has a different meaning for people in each of these three categories. The most critical is status of a household at the end of the month (what they can buy, where they can live, what kinds of rents they can afford).

Gross Domestic Product is an indicator of a global statistics and average salary (calculated by Purchasing Power Parity, PPP in $) is an indicator on a real living standard. In the Philippines, the average monthly wage of $279 and it represents 19% of the world's average wage which stands at $1, 480 or p63, 340 per month.

It means that Filipino social participation in investment into CC impacts is below the International Labor Organization (ILO, 2012) counted average. The Philippines are 69th among 72 counties included in a survey.

Social Stability

Long-term investment is affected by specific risks. For the purpose of this example we looked at the upper and the lower medial income categories over the last 50 years.

Table 4: Median Income of a household 1961 -2009 (general snapshot throughout the Philippines).

Households	1961	1985	2000	2003	2006	2009
Median Income	1	20	89	95	111	135
Upper 50%	82	80	82	81	81	80
Lower 50%	18	20	18	19	19	20

Comments: The median income split between the upper and the lower 50% remained over the past fifty years almost the same. SWS, Dr. Tomas Africa, 2011

Household's trends (income, savings)

Table: 5: Annual household income cut-offs by income categories.

Year	Income Category			
	Low (LIC)	Middle (MIC)		High (HIC)
		Lower Limit	Upper Limit	
2010	< 294,296	294,296	2,393,125	> 2,393,125
2006	< 246,109	246,109	2,000,072	> 2,000,072
2003	< 203,109	203,109	1,651,632	> 1,651,632
2000	< 178,468	178,468	1,449,295	> 1,449,295

Comments: Special computation of the National Statistical Coordination Board (NSCB) Technical Staff using the results of the 2000, 2003, 2006 of the National Statistical Office (NSO). Household savings ratio of the high-income families is presented (e.g. in 2006, the HIC decreased from 50% in 2003 to 47% in 2006; MIC remained at 20% from 2003 to 2006 while for the LIC, it went down from 4% to 2%).

Households

In relation to Table 4, we compiled results of a survey of average monthly income (by categories) over the 30 years time period. For 1985*–2000, only total number of households was found, and data for 2010-2015 are not probably published yet (an info was not found).

Growth of number of households changes in incomes categories (LIC, MIC, and HIC) distribution over decade, and average saving ratio are in Tables 6 and 7.

Average monthly income and expenditures illustrate growing income of HIC at expense of MIC and increasingly large share of LIC (in PHP).

Table 6: Household's growth and changes over the last 30 years.

Households		1985*	2000	2003	2006	2010	2015**
HIC	Total Households (TH)	-	51,160	25,849	19,738	x 1.7	-
	Share to TH	-	0.3	0.2	0.1	-	-
	AM Incomes	-	211,579	181,505	194,965	235,155	-
	AM Expenditure	-	78,475	96,807	114,035	137,542	-
MIC	Total Households (TH)	-	3,422,524	3,286,010	3,317,824	x 1.7	-
	Share to TH	-	22.7	19.9	19.1	-	-
	AM Incomes	-	22,392	25,075	30,622	36,934	-
	AM Expenditure	-	17,347	20,189	24,680	29,767	-
LIC	Total Households (TH)	-	11,598,258	13,182,297	14,065,921	x 1.7	-
	Share to TH	-	77.0	79.9	80.8	-	-
	AM Incomes	-	5,766	6,355	7,513	9,061	-
	AM Expenditure	-	5,186	5,785	6,918	8.345	-
TOTAL Households:		9,847,000	15,072,000	16,480,000	17,403,000	18,400,000*	-

Comments: The table presents data by the by the NSCB, Dr. Romulo Virola, 2010.

Table 7: Average savings ration of households by incomes categories

Years	Incomes Categories			
	Low (LIC)	Middle (MIC)	High (HIC)	All
2006	0.02	0.2	0.47	0.06
2003	0.04	0.2	0.50	0.07
2000	(0.93)	0.48	0.94	(0.61)

Comments: Computation by the National Statistical Coordination Board (NSCB) Technical Staff using the results of the 2000, 2003, 2006 of the National Statistical Office (NSO).

7. Electric Power Generation

We understand access to electricity as a basic human right and billing for electricity as a stimulator of financial literacy in socio-economic system.

Where We are Now

Around the world, we can see a fast development and a lot of new approaches to electrification. In that context, the following are some quotes from a speech by David Crane, CEO of NRG Energy and Richard Lester, head of the department of nuclear science and engineering at the Massachusetts Institute of Technology, presented at the fifth annual ARPA-E Energy Summit:

- *"Think how shockingly stupid it is to build a 21st-century electric system based on 120 million wooden poles"*
- *"You can strengthen the system all you want, but if you accept that we're in the first stage of adaptation, the system from the 1930s isn't going to work in the long term"*
- *"I don't understand why it's so shocking [to imagine a scenario] where the grid is, at best, an antiquated backup system to a different way of buying electricity"*
- *"The dark secret of the power industry is that American homes waste 20 percent of energy. Energy efficiency will never get far if it involves just asking people to turn things off, but we're just at the brink of automation"*
- *"We can't address carbon just relying on end-user innovation"*
- *"Forget about just solar and electric vehicles as disruptors".*
- *"Why do I have two expensive electric delivery systems into my home? I don't want the one that gets ripped down in every storm."*

Electricity Consumption in the Philippines

The Constitution of the Philippines recognized access to electricity as a "basic human right" and the country has an experience with the fact that charging for electricity stimulates economic growth and improve financial literacy. As a country of so many islands, it especially needs a decentralized electrification.

For a comparison: the Czech Republic, having 10-times smaller population than the Philippines, consumed 10-times more kWh of electricity per capita in 2009.

Table 8: Total Electricity Consumption in the Philippines and the Czech Republic

Country	Total Electricity Net Consumption (billion kWh)			Per Capita (kWh)
	2009	2011	+	2009
Philippines	51.817	58.326	6.509	593
Czech Republic	58.815	60.247	1.432	6 114

Electric Power Rates and Economic Development (in 2011)

The Small Power Utilities Group (SPUG) traced the high cost of electricity in the Philippines documented an obvious fact that all costs - from producing power to power distribution and taxes - are passed on to consumers.

The Philippines are the only country in the region that has privatized its electric power sector and has no state subsidies for electric power rates.

Menelao Carlos, Chairman of the Federation of Philippine Industries (FPI), said that the prohibitive cost of electricity in the country must be the biggest reason why foreign investment has been shrinking while it is kicking up in other countries in the region.

The study also found that households pay the highest rates at P10 per kilowatt/hour on average, shouldering the biggest burden of high electric rates. In other Asian countries, rates for commercial establishments are highest.

Electric Power Rates and Economic Development (in 2013)

The Philippines don't need more privatization and economic liberalization but they need a stronger state that (a) can bust up oligarchic collusion, and (b) protect the interest of consumers and productive sectors of the economy.

In the 1990s, similar to most other developing countries, the Philippines engaged in a wide-ranging process of economic liberalization that saw a massive expansion in the private ownership and operation of key economic sectors such as water, infrastructure and electricity.

The transition to a market economy culminated in a passage of the Republic Act 9136, or the Electric Power Industry Reform Act, better known as EPIRA, in 2001 (for more see the Legislation Chapter).

After more than 12 years, EPIRA has not brought about the promise of efficiency in power distribution and in lower electricity rates. Still, it is far from clear whether there will be any definitive resolution of this particular crisis, namely the revision or abrogation of the EPIRA law.

Overall, it seems to be the case that the Philippines are paying the price for decades of mindless privatization in an undeveloped socio-economy environment.

According to Karen Brooks (Adjunct Senior Fellow for Asia at the Council on Foreign Relations) what the Philippines need is empowerment of state institutions as well as a new, emerging entrepreneurial class, which has been hammered by oligopolistic businesses and lack of an independent, enabling regulatory regime. In short, in a same time a more "effective" state and more "competitive" market.

Small Power Utilities Group (SPUG) in the Philippines

At the present, NPC-SPUG operates 529 power-generating units with total rated capacity of 283 MW in 233 areas. This nationwide operation is composed of 291 land-based power plants, 1 hydroelectric plant, 1 hybrid wind turbine farm, and 11 barge-mounted power plants.

NPC-SPUG generated a total of 470,000,000 kWh (5.8 kWh per capita) with aggregate energy sales of 440,000,000 kWh (5.5 kWh per capita).

Additional power plants are in construction but their contribution to the national economy and social stability is still small (about 1% share on the total power production in the Philippines).

The system serves 233 island customers consisting of 41 electric cooperatives and 10 local government units. Currently, 22 island grids (or 9% of the 233 total) island grids provide 24-hour electric service, while the remaining 211 grids (or 91% of the total) are operating less than 24 hours a day as shown below:

Table 9: Service Hours in SPUG Area

Service Hours	Areas	Plants
Less than 8 hours	162	218
Between 8 – 15 hours	36	38
Between 16 - 23 hours	13	18
24 hours (not all 7 days per week)	22	28

Electricity Charges

It is in interest of local government administration to protect internal financial flow of charges paid for services. The money collected from end users of utility services should be under oversight by public administration.

Table 10: An example from Sorsogon II Electric Cooperative, June 2012

Break Down of Charges per month	Php	USD	%
Generation	5.71	0.14	47.0
Transmission	2.05	0.05	16.9
System Loss	0.94	0.02	7.7
Distribution*	2.38	0.06	19.6
Subsidies**	0.15	0.004	1.3
Government Taxes***	0.92	0.02	7.5
Total energy charges:	12.15	0.29	100

Comments **A**: Table 10 can be used to illustrate money flow out of the pockets of end users of electricity into electric cooperatives (2012). The model assumption is 100W per person for one hour. It represents 36.5 kWh per year. For all inhabitants of a province it represents (36.5 x 12.15 x 1, 000, 000) p443m ($10.7m) per year.

Comments **B**: *includes Distribution, Supply and Metering Charges, **Includes Lifeline and Senior Citizen, ***Includes Universal Charges and Value Added.

Comments **C**: "Lifeline Rate Subsidy": refers to a discount given to a residential customer who uses up 100 kWh a month or less. Customers that use 50 kWh and less pay only half the actual cost. Those who use 51-70 kWh get a 35-percent discount while customers who use 71-100 kWh get a 20-percent discount. Those who use more than 100 kWh shoulder this subsidy.

Table 11: Example from Sorsogon II Electric Cooperative, March 2014 (p43, 3150/1$ in0.081 July 2014)

Break Down of Charges per month	Php	USD	%	%
Generation	3.53	0.081	37	24
Transmission	2.01	0.046	-	-
Distribution*	0.70	0.016	-	-
Metering	0.52	0.012	-	-
System Loss	0.86	0.020	-	-
Others	1.87	0.043	-	-
Retail Customer (RC)	5.00	0.115	-	-
TOTAL with RC:	14.50	0.335	-	100%
TOTAL without RC :	9.50	0.210	100%	-

Comments: compare share of generation charge (and other charges) in March 2014 (37% or 24%), in June 2012 (47%) and in Meralco Annual report /2010) we can see a generation charge (58%). To compare structure of item from June 2012 and July 2014 (only two years) we can se differences that should be explain during the SPC Prospectus preparation.

Table 11 illustrates how much money flows out of the pockets of end users of electricity into electric cooperative (2014). A model assumption is 100W per person for one hour and it represents 36.5 kWh per year. For all inhabitants of a province it represents (36.5 x 14.50 x 1,000,000) a value of p529m ($12.8m) per year. Retail Customers Charges (12 x 5.000 x 1, 000,000) represents a value of p60m ($1.5m) per year.

For example, in 2007, Sorsogon City generated 180 kWh per capita (27,800,000 kWh for 150,000 inhabitants). If a city collects (for 30 years) only p5 per person per month brings the city (30 x 12 x 5 x 150, 000) p 273m ($6.2m). For the province it is p1800m ($41m).

Both tables 10 and 11 indicate two perspectives at the issue of electricity charges.

- The first is a gross interval for money flow in a province.
- The second presents differences in charging total rates and differences in individual items (breakdown of 2012 and 2014).

Table 12: An example of electricity charges in 2014, 2013, and 2012, all in PHP

Month, Year	Generation Costs	Total Cost without Retail Customer	Retail Costumer Charge	Total Cost with Retail Customer
March 2014	3.53	9.4978	5.000	14.4978
February 2014	5.72	12.6084	5.000	17.6084
January 2014	5.72	13.4984	5.000	18.4984
December 2014	5.73	12.0966	5.000	17.0966
November 2014	8.92	15.0138	5.000	20.0138
October 2014	5.48	11.3890	5.000	16.3890
September 2014	4.20	10.0436	5.000	15.0436
August 2014	3.93	8.9336	5.000	13.9336
March 2013	2.76	7.1522	5.000	12.1522
March 2012	2.76	7.2453	5.000	12.2453

Comments: it is difficult to understand a "jumping" of generation cost (see also Tables 10, 11) and for a special discussion many questions are still open.

Both tables 10 and 11 indicate uncertainty-surrounding setting up individual components of electric power rates. The table 12 presents a serious irregularity. Fluctuations in charges for electricity just over several months are unacceptable. External evaluator can understand the causes but the very rapid decreases of up to 50% suggest that the remedy is only an administrative (operational) solution and not a systemic correction.

Table 13: Small Power Utilities Group (SPUG) - a sample of rates system in the Philippines, April 2014

Examples of Areas (Provinces)	Effective Rates in PHP/kWh								
	Subsidized Approved Generation Rate (SAGR)					Deferred Accounting Adjustment (DAA)			
	GR	+SAGR	Tot GR	Total	Total	3thGRAM	3thCERA	Total	Total
	a	b	c=a+b	d	e=c+d	f	g	h=f+g	i=e+h
Catanduanes	5.6404	-	5.6404	-	5.6404	0.5585	0.3907	0.9492	6.5896
Palawan	5.4923	-	5.4923	0.1481	5.6404	0.5585	0.3907	0.9492	6.5896
Luzon Group	3.7064	1.0960	4.8024	-	4.8024	0.5585	0.3907	0.9492	5.7516

Comments: We selected the above three areas for their specific characteristics of Effective Rates based on Generating Rates (GR). "3thGRAM" is the rule 3 for the Generation Rate Adjustment Mechanism for the recovery/(refund) of the deferred fuel cost and purchase power cost. 3thCERA is a Currency Exchange Rate Adjustment used for recalculation of exchange rates of a new $ to PHP. Power customer shall also be billed with UCME of 0.0454 (Basic) and 0.0709 (True-Up). ERC Decision dated March 7, 2011 on ERC Case No. 2006-020RC; effective June 2011 billing; ERC Decision dated September 24, 2012 on ERC Case No. 2007-097RC.

Transparent, accountable and sustainable charges for services are positive signal to donors to take financing care for investment in new projects. The most important is to keep balance between prices being charged and income of High, Middle, and Low (H, M, and L) Income Classes. Electricity charges are a barometer of efficiency of an economy and central and local administration.

Aware of this rule, we choose (for the financial model of the pilot project) to use a sufficiently wide interval that includes electricity charges for both the Generation Rates (GR) and for Total Energy Charges.

8. Legal Framework

A brief survey of the legal framework of the PPP environment and drivers (e, w, m) in the Philippines.

Public Private Partnerships

- Republic Act 7160 – The Local Government Code of the Philippines, 1991
- Republic Act 8974 - The acquisition of Right-of-Way, site or location for national government infrastructure projects and for other purposes, 2000
- Republic Act 7718 - The Philippine Amended BOT Law, Revised Implementing Rules & Regulations (IRR), 2012

Renewable energy sources and clean water

- Republic Act 9513 – The Renewable Energy Act of 2008; promoting the development, utilization and commercialization of the renewable energy resources (RES) and for other purposes
- Republic Act 9367 – The use of biofuels, establishing for this purpose the biofuel program, appropriation funds therefore, and others purposes, 2007
- Republic Act 9275 –The Philippine Clean Water Act of 2004,
- Department of Energy (DOE) Circular No. 2009-01-0010 – Guidelines for the accreditation of manufactures, fabricators, and suppliers of locally- produced renewable energy development and components
- Department of Energy (DOE) Circular No. 2009-07-0011 – Guidelines governing a transparent and competitive system of awarding renewable energy services/operating contracts and providing for the registration process of renewable energy development.
- Department of Energy (DOE) Circular No. 2007-05-0006 – Rules and regulations implementing Republic Act No. 9367
- DENR Administration Order No. 2005-10 on implementing rules and regulations of the Republic Act No. 9275, The Philippine Clean Water, 2005
- Republic Resolution of Energy Regulatory Commission No. 16, series of 2010 – Resolution adopting the feed-tariff rules

9. Drivers of Social-Economy Development

The following three key processes for social-economy development in a country have been identified:

a) Decentralized electrification based on renewable energy sources (RES)

b) Control and management of a renewable rain water and its use in a landscape for other purposes

c) Locally available renewable material as in a natural form (e.g. coconuts and bamboo forests) and as in waste form (e.g. post harvesting waste, municipal waste etc.).

The SPC Concept is a tool supporting synergy effects in implementation of all three processes and the SPC Utility is an organization unit to stimulate, control and manage synergy processes.

The SPC Concepts motivates public and private sectors to cooperate (by applying PPP mechanism) in a framework of a local environment (e.g. by a "Master Planning" technique) and respect each other by using a common document (e.g. by "Citizen's Charter").

Why socio-economic development?

In the Philippines (Table 4), the median split between the upper and the lower social levels has been almost the same (20:80) for 50 years. Any variation of this ratio represents a disadvantage to the lower level and it is a serious risk of a loss to socio-economic development in a province. For the sample (Table 3), a province with high GINI coefficient (more then 40) and low reserves for social reconciliation (Tables 6,7) the model of "socio-economic development“ is the most pragmatic solution.

The question is how should be this model prepared and implemented. Answers should be found through direct contacts with future clients of the SPC Utility (marketing research is still ahead of us).

Why three drivers (e), (w), (m)?

The Case Example aims at three general goals. (1) To assure access to electricity for inhabitants as their basic human right. (2) To assist development of financial literacy through their participation in financial operations induced by implementation of the SPC Concept. (3) To demonstrate benefits of the concept on the Pilot Portfolio Project. The key players are households and micro, small and middle entrepreneurs in a province.

Decentralized electrification (e) is the primary driver. Rainwater management (w) and biomass management (ma) are driven by (e) and all three creates a synergy pool of common benefits of a province/city/ municipalities and barangays. These drivers were used in presentation of the SCP Concept and they were recommended to be the focus in preparation and implementation of the SPC Pilot Portfolio Project.

9.1 Decentralized Electrification

Power Plant Units:

For Solar, Hydro, Biomass, Wind, Geothermal, Diesel, and Battery Storage power plants solutions (in solo and/or mixed applications), the cost-effectiveness ($/kW, $/kWh) we define "virtual" 100kW units serving of access to power for 24/7 all year services. 100 kWe is a modular solution offering flexibility fitting the needs of final beneficiaries in peri- urban, rural and outlying areas of a province. This modular solution has a link to financial model calculation for the Pilot Project proposal presentation in a following paper).

Solar energy:

Both thermal and photovoltaic solutions are available: solar thermal for hot water or for drying food, solar PV for electric power generation. Solar technology applications enable end users to pay SPC Utility for electricity they used. Relatively cheap 100 kW solar generators can satisfy critical deficit in availability of electricity on poorer islands of the Philippines but it is recommended that their installation is linked to the SPC Concept (to apply a portfolio of sources diversification).

Hydropower:

Small hydropower of up to 10 MW output, mini-hydro of less than 1 MW, and micro-hydro of less than 100 kW are offered with standard technologies and prices. Operation of micro-hydro systems has proved the ability to generate between 10 and 100 times more of electric power than PV or wind for the same amount of capital investment.

Biomass energy:

Biomass (agriculture waste, crops residues, woods, organic waste) is available in a majority of geographical locations. There are various kinds of biomass use: direct use (burning), indirect use (biological and thermo-chemical conversion, pyrolysis and gasification). Biomass technologies are reasonably priced and have positive influence on "landscape cleaning".

Wind power:

Wind technology is very advanced a broadly used around the world (wind farms or windmills for mechanical power, and wind-pumps for water pumping or drainage). The Philippines and their islands are windy areas, thus very suitable for this technology in both onshore and offshore solutions.

Geothermal energy:

Geothermal power is cost effective, reliable, sustainable, and environmentally friendly, but has historically been limited to areas near tectonic plate boundaries. The Philippines have a large potential for utilization of this energy but drilling and exploration for deep resources can be very expensive.

Diesel Generators:

Diesel generators are proven technology offering a great flexibility in applications but they have a strong dependency on fuel (oil, biodiesel, and ethanol).

Batteries:

A rechargeable battery, storage battery, or accumulators are a type of electrical battery mostly used for electrochemical energy storage. Rechargeable batteries come in many different shapes and sizes. Energy accumulation systems (generally) is at present characterized by a fast research and development.

On Grid Solution:

For a century, vertically integrated monopolies built power plants, strung transmission and distribution lines, billed customers, and were rewarded with a predictable return on investment. That has been now changing. Consumers in developed countries demand more control over the energy. In developing countries, the need of 24/7 accesses to electricity is becoming much more urgent. Transfer of best practices must include building of business models for three types of customers: those with high, middle, low income respectively (e.g. Table 5). Technology transfer seems to be simpler than transfer and implementation of organizational function of a utility and motivation of customers to participate.

Off-Grid Solution:

Existing off-grid electrification typically includes a diesel generator and specific demands on availability of diesel fuel, spare parts and trained engineers for maintenance. Renewable energy sources are environmentally friendly, maintenance free and highly efficient, with a long operating life and comparably low operating expenses. Taking into account these advantages a mix solutions are recommended.

9.2 Rainwater Management

Why rainwater management?

The Philippines are an island country with skills in hydrogeology's engineering going back for more than 2,000 years. North Luzon has been known for its rice terraces for more than 6,000 years. Terraces are one of the biggest "sculptor" works in open countryside and they are unprecedented example of a rainwater management.

The sense for space and understanding of the causes of geological changes and disasters (territorial rains, typhoons, earthquakes) supplemented by hydrological exploration and amelioration works, construction works, especially the movement of the material and its storage, and logistics management and maintenance system of terraces done over many centuries and increased yields in rice harvesting are example of a synergy at work.

Planting, growing and harvesting of rice is done on terraces which are 2 to 3 meters high which with the overall height of a terraces of up to 1,000 meters. People have a unique set of management skills which are in harmony with life of a local population and surrounding nature. Rice terraces are not only a tourist attraction but they are real example of engineering skills for universities and engineers to study and apply in contemporary projects.

Why synergy?

To survive, we need drinking water. But for a higher quality of life we require cold water for drinking, service water for irrigation, boiling water for cooking, and hot water for our hygiene. Look at the times of the ancient Rome: public spas as cultural and business centers (at that time without electrification). The principle was simple: to capture rainwater, to warm up it by the sun, to store it in tanks before use. We can now do better with availability of electric power. “Rainwater management” projects are based more on the ability to organize and to conduct business at local level and to apply stimuli of science and available and reliable technologies.

9.3 Biomass Management

Biomass is biological material derived from living, or recently living organisms. It most often refers to plants or plant-based materials. Biomass management has been driven by development of alternative energy sources. The SPC Concept offers more opportunities for synergy of new plant-based materials and waste from biomass with other industries (not only for energy production). Those include job creation. For the Case Story, two samples were selected: growing bamboo and palm trees and using waste coming from their planting and from their use by the industry.

Bamboo

Bamboo has been traditionally used to make a wide range of everyday use goods in South Asian, Southeast and Far East countries (archaeological excavations have uncovered bamboo baskets dated 2,000-1,000 BC). There are numbers of types of bamboo that are planted or grow in a wild in tropical areas. (e.g., in the Philippines there are about 70 species). For the purpose of the Case Study, the most important is are giant bamboos, which are the largest members of the grass family.

Bamboos are some of the fastest-growing plants in the world, due to a unique mass of roots (rhizome) system. Bamboos have notable economic and cultural significance for local communities, mostly for medicine (treating infections), food (bamboo shoots), for textile and paper (bamboo fibers), seawater desalination, furniture making, and green houses, including interior accessories (eating utensils such as chop sticks, trays, and tea scoops) etc. Its effectiveness as a feedstock for the production of Biofuels is a strong potential for future.

There are two other examples of bamboo use that should be mentioned: a) bamboo in construction industry sector (bamboo has higher compressive strength than wood, brick or concrete and tensile strength that rivals steel), and bamboo in energy sector (is used as an additive material for burning fossil fuel, for direct burning and for pyrolysis's systems). Bamboo management includes planting of new bamboo (bamboo plant needs 7 years to be fully grown and ready for the first harvest), care for the forest and post-harvest sales. Several bamboo species grow at a surprising rate of 37.5 cm or 15-inches per day and have the ability to mature within 4 to 5 years from date of planting.

Bamboo multiplies its harvest quantity in terms of poles and shoots such that annual harvest is possible almost annually and can provide livelihood for over 90 years. Managed plantations can produce up to 40-tons per hectare annually, in addition to several tons of shoots which should be harvested to maintain proper distance between poles (e.g. the largest Chinese bamboo plantation with 7 million hectares generates revenue of $1,500m annually). Most bamboo trees have a natural tendency to cling strongly to the soil with its widespread root system and rhizome networks. With this, it can be used to replace even the fast growing forest trees and it is suitable planting material especially along water banks. It averts erosion, retains moisture as well as macro and micronutrients in the soil. Bamboo is beneficial for use in watersheds and near tributaries due to its filtering properties and absorptive capacity to retain minerals and nutrients as well as impurities, which serves as building blocks for its cell growth. Microclimate development is enhanced as well as sufficient moisture within the root zone made available for release during dry months

Coconuts

The ability of coconuts to grow in climatically hostile regions brings benefits to growers. Throughout the ages, all parts of the tree and the nut have provided basic essentials to the mankind – water for hydration, flesh for eating, oil for household use and vegetation and timber for shelter. Coconut trees grow in sandy soil, even along seashores where most other trees and plants would fail.

They can live and bear fruit for up to eighty years and are commonly viewed as a "three-generation tree" which can support a farmer, his children and grandchildren. A rise in market demand for coconuts greatly helps local people to get a job, to have a food and earn money for health care and for education of their children. Coconut trees secure local economy for a long time.

From the coconut trees, a multitude of products can be derived: the nuts (kernel/ meat, coconut milk, coconut oil, coconut water or juice); the coconut sap (fresh sap, natural vinegar, coconut nectar/honey/syrup and natural sap sugar and other application for different medical services); non-food raw materials (activated carbon and other product like soap and cosmetics, charcoal, coir etc.).

These are the forests not only for domestic rural life but coconuts palms are beautiful and useful trees for towns and surrounding sub-urban areas. Very practical and profitable is cultivation of cash crops together with harvesting of coconuts (maize, banana, papaya, pineapple, and peanuts).

The coconut supply-demand imbalance in the Philippines deteriorated further in November 2013 as a result of Typhoon Haiyan. The natural disaster caused estimated $110 million loss in crops, inflicting damage to agricultural sector of more than twice that value. An estimated 33 million coconut palms (11% of nation's total) were destroyed. It is 'back to year zero' for coconut farmers in the Philippines, with a seven-year lead before the palms start to yield fruit.

The reality is that one in five Filipinos are for their livelihood in some way dependent on coconut production, with coconut farms accounting for 26% of the country's farmland. However 44 million palms (14% of nation's total) are past their productive peak. Similarly, Indonesia's four million hectares are made of palms over 50 years old.

The coconuts tree planting is a great challenge for India (coconuts contribute a total of $1.3 billion a year to the nation's GDP, and the Kerala, India's main coconut producing state, comprises 450,000 hectares of land that needs to be replanted due to aging palms). Planting of hybrid palms trees planting is considered in a future.

Bamboo and coconut

Bamboo and coconut belongs to a category of 'forests for three (human) generations". Such forest can improves microclimate system that is helpful in dealing with negative effects of Climate Change (CC).

Bamboo and coconut palms reduce risks from disasters due to climate extremes (storms or cyclones) and sea-level rise (coastal flooding).

Trees help to regulate regional climate and protect the soil and regulate water in countryside. They protects riverbanks, seacoast, regulate floods in watershed and they are useful as a floodplain forest.

10. Key Tasks

The Self-Powered Community Pilot Project in the Philippines (by chapter)

1. Self-Powered Community Concept (SPC Concept)
2. Territorial assumptions and motivation to adopt and embrace the SPC Concept
3. Dissemination of the SPC Concept and Pilot Project for the Philippines
4. Absorption capacity of a public administration and acceptance of the PPP mechanism
5. Presentations of the SPC Concept to local government
6. Feasibility and sustainability of the SPC Concept (return on investment)
7. Trends in electric power generation (feasible solutions)
8. Legal framework of the SPC Concept illustrated on the Pilot Project
9. Drivers of socio-economic development (at local, regional, national, and global levels)

9.1 Decentralized electrification based on renewable energy sources (RES)

9.2 Rainwater management: a renewable source (RS) for life in a territory

9.3 Bamboo & coconut forests as renewable sources (RS) for a local economy

10. Centers for dissemination of the SPC Concept (development of know-how and synergy effects)

Key Tasks (reflecting chapters)

1+2 Visit the 5PforRES.eu website, read the Case Story, communicate and work on the Pilot Project of the SPC Concept and prepare Business Plans for donors.

3+4 To specify differences of social-economy between developed and developing styles life, and cooperation with local administrations to understand the PPP mechanism, and SPC Concept.

5+6 To cooperate in a triangle of: public administration, private sector and Development Banks, and prove feasibility a sustainability of the Pilot Project (return of investment for donors).

7,8. To analyze differences between energy services in developed and developing world, and prove advantages of the SPC Concept in a real legal framework (to check and solve discrepancy).

9. To advocate social-economy drivers for the Pilot Project, and prove synergy effect of drivers in processes, organization and motivation to prepare and implement the SPC Concept.

10. To advocate the Pilot Project results in the world and offer to countries (on continents) to found and operate SPC Centers for a territorial building and development of the SPC Concept.

Thank you

www.5PforRES.eu

Zdenek Chalus, PhD
5PforRES s.r.o.
Managing Director