



100 LIFT SCHEMES – COMPARING ELECTRIC LIFT AND SOLAR LIFT WATER SUPPLY SCHEMES IN WESTERN NEPAL

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RWSSP-WN II Nepal-Finland Cooperation April, 2018 Kathmandu









ONE HUNDRED LIFT SCHEMES COMPARING ELECTRIC LIFT AND SOLAR LIFT WATER SUPPLY SCHEMES IN WESTERN NEPAL Rautanen* & Ghimire** RWSSP-WN II, Nepal-Finland Cooperation * FCG International Ltd., Finland ** DoLIVAR, Government of Nepal



Background

- Rural Water Supply and Sanitation Project in Western Nepal (RWSSP-WN)
- Serving the unserved reaching the unreached -> mountain (hill) top!
- Completed 101 lift water supply schemes (as of 08/2017) which serve 37% of the total population served by the project
- 48% solar lift, 52% electric lift



Sample N-100





Sample by District N-100





Sample by Lifting system N- 100 schemes







Sample by Lifting system N- 54,554 present population served





Total vertical height pumped by 100 schemes: 15,416 meters





Total pipelines in 100 schemes: 474,519 meters





Technical summaries

- 95% of pumps are submersible volumetric pumps
- 65% pump position vertical
- 88% electrical components have earthing
- 64% have lightning arrester
- 62% are AC, 35% DC, 3% hybrid
- 73% monocrystalline panels
- Watt per panel ranging from 120 W to 315 W, median 190 W











Electric to solar? Solar to electric? Assumptions for calculations

- Distance of electrical line from Transformer to pump house 500m
- Pumping Hours 4 to 5 hours
- Transformer included (electrical lift)
- Spare pump is included
- In case of Solar lift, Pedrollo Pump used; and in case of electrical lift, KSB
- Cost comparison focusing on power source







Variety of electricity bills

70,000





Too many operate at breakeven point



Lift systems serving the unserved





Time saved = women benefit





Economic rate of return

Assumptions:

- 4 trips / household / day
- Category 31-45 minutes
 -> 37 min
- Category over 45 min

 -> 60 min
- Daily minimum wages* NPR 228 (about 2 USD)
 -> 1 hour NPR 28.5

Then:

- Total time saved in one day: 16,200 hours
- Daily worth with minimum wage*: NPR 461,696 (USD 4,398)

* Agricultural labour daily minimum wage



What WUSCs think about their scheme (N-100)





Disaggregated using: 7.2 Does this scheme need help from RWSSP-WN to solve any pending issues that came up during this survey? If yes, make a note in note book about what kind of issues

Leaflet | Tiles © Esri — Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, UPR-EGP, and the GIS User Co

TAPKE DWS, SYANGJA: example of a distribution network त्राज्य सामप

नातथा सरसफाइ अ केवरेभञ्ज्याङ-६र७,स्योङ्जा सामाजिक तथा प्राविधिक विवरण 9. योजनाको नाम :~ ताप्के सानेपानी तथा सरसफाड उपमोक्ता समिति २. योजना निर्माण अवधिः-२०६७-०३-१३ देखि २०६७-१२-३० सम्म 3.लामान्वित घरधुरी संस्याः-(THH-98C TPOP-9200) क. दलित घरधुरी संख्या - २६ जनसंख्या - १६० जना स. जनजाति घरधुरी संस्या ~१२२ जनसंस्या-१०४० जना ४.उपभोक्ता समितिको सदस्य संस्याः-८ जना महिला ४ जना पुरुष ५ जना **५. योजना अन्तर्गत निर्माण भएका संरचनाहरू**ः-क. मुहान टंकी -२ वटा पानी टंकी -३ वटा स्त, मुस्य पाइप लाइन-७३० मिटर ग. शाखा पाइप लाइन-५२५० मिटर घ. सार्वजनिक घारा संख्या-२६ वटा ङ योजना पूर्व निर्माण चर्पी संस्था -४२वटा र सन्तराजन प्रभुनान निर्माण चर्पी संस्था-१४३वटा

योजानाको वास्तविक लागत ९. नेपाल सरकार + फिनल्याण्ड सरकार ५३०६५७७५४। २. जि. बि. स. र. १०१४४४। ३.गा.वि.स. स. १४७३८०/-8.समुदायको नगद र जनग्रमदान रू.१०४८८२०।-कूल लागत स. 2368830/-उपमोक्ता समितिको विवरण अध्यक्षः - मसालसिंह सिंजलि वाध्यक्ष :- सांकनहादर जीवजनसंहर साल মারা

KOTIAMAI, RUPANDEHI JOGADA, RUPANDEHI

AAMA, RUPANDEHI



CHHAPDANDA, SYANGJA

JHAKRIPAHARA YESULUPAN, TANAHUN

BASANTPUR, KAPILVASTU









MULBARI, ARGHAKHANCHI

SAMAKOT GIDDEDANDA, SYANGJA

PATAPANI, TANAHUN







Conclusions

- Overall better functionality than expected
- Overall WUSC proactiveness in solving their costly problems better than expected
- Solar suffers from fog and perhaps also from panels that are not kept clean
- Electricity bill can be major limiting factor
- Technical functionality problems with pumps can arise within the first 2-3 years



Recommendations

- There needs to be a genuine demand for the system
 = hardship = interest in taking O&M seriously
- WUSC needs to take ownership from the start: must have a skilled maintenance worker, Operation & Maintenance Plan + adequate water tariff
- Water intake needs attention lifting systems more sensitive than gravity flow systems – 'piped' is not necessarily 'safely managed'



References & Acknowledgements

- People who did the scheme surveys: Bashu Pandey (21), Bishnu Gurung (15), Dipendra Khatri (16), Jeevan Kaji Bajracharya (9), Aura Liski (8), Rajesh Gupta (8), Tej Ohja (5), Suraj Oli (5), Prashanna Pandey (4), Rajan Ranabhat (3), Tej Bohara (2), and the following one each: Bipin Poudel, Sangita Khadka, Suman Basnet, Ram Sharma, Lokendra Prakash Oli
- **Thanks to:** Ministry for Foreign Affairs Finland and Ministry of Federal Affairs & General Administration/DoLIDAR, Nepal

THANK YOU! Any questions?



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