



Lesoni 6 - iVolanivuli

# Lewai Vakailavo ni Sasaga ni iVurevure Tudei

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Vakailavotaka na:

**KOICA**  
Korea International  
Cooperation Agency

Ena veitauriliga kei:



  
Pacific Islands  
Development Forum





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Na lesoni **“Lewai Vakailavo ni Sasaga ni iVurevure Tudei”** na ivakamacala taumada ni yavu ni qaravi vakailavo ni sasaga ni ivurevure tudei.

Ni sa oti na lesoni qo, o na kila na veika qo:

- Sasaga ni ivurevure tudei e caka tiko se rawa ni caka ena koro.
- Yavu ni qaravi vakailavo ni sasaga ni ivurevure tudei
- Vanua eso e rawa mai kina na ilavo ni sasaga ni ivurevure tudei.
- Yavu ni ilavo rawa kei na ilavo vakayagataki ni sasaga ni ivurevure tudei.
- Sala eso meda veivosaki kina kei na tabana ni matanitu, isoqosoqo, se itokani ena veivakatorocaketaki me rawa na veivuke ena sasaga ni ivurevure tudei.

## iTuvatuva ni Lesoni

### TEVELI 2: iTuvatuva ni Lesoni

| Wase                                                                 | Mataqali Lesoni        |
|----------------------------------------------------------------------|------------------------|
| 1. Tou veikilai mada                                                 | Vuli kei na iVakadre 1 |
| 2. Cava na qaravi vakailavo ni ivurevure tudei?                      | Vuli                   |
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Na ivolanivuli qo e yavutaki ena kena Salavata nei Qasenivuli (Trainers Guide). Sa vakarawarawataki na lewenivola ka vakalekalekataki, qai vakabibitaki kina na droini, yaloyalo kei na kena ivakadre me ratou veimaliwai vinaka tikoga kina na lewe ni vuli kei qasenivuli ni toso tiko na vuli. Ke o gadreva

na ikuri ni ivakamacala ni wase cava ga, mo raica na Salavata nei Qasenivuli.

Taba e waqanivola: <https://www.maxpixel.net/Home-Coin-Investment-Money-Finance-Business-Bank-2724238>.

**Moni Kila:** Na Global Green Growth Institute e sega ni yalataka, se yalataka lo madaga, ni donu se taucoko na itukutuku ena ivola qo, se rawa ni veilewaitaki ke cala, ni dua e vakayagataka na vua ni itukutuku se iyaya se cakacaka e volai kina, wili kina ni beci na dodonu ni kena itaukei.

## iVolavosa

**Livaliva dri** – mataqali livaliva e rawa mai na idini lelevu me baleta na iyaya lelevu me vaka na TV se misini ni savasava

**Daunifika** - Koya e vakaivolataka na ilavo ni bisinisi, se vakayagataki se rawa mai.

**Bereki ni Jaji** – Ka e yalana na jajitaki beteri, de qai jaji vakasivia

**Cau** – iLavo soli baleta na sasaga, sega ni vakasukai

**Dinau** – iLavo soli me vakayagataki, me qai vakasukai kei na kena tubu.

**Jaji** – Sema na kena wa ina bateri me tubu na kena kaukaua. E dau jajitaki vakalevu ena ulunisola

**Jaji sivia** – Nida jajitaka tikoga na bateri ni sa tawa – me vaka ni sinai na vokete qai vua tale – ena ca na bateri.

**Kui** – Ka e kui se drodro ena waya, sema kei na kaukaua (volt) me solia na pawa

**Liganicau** – iSoqosoqo se tamata e cau ena sasaga

**Livaliva Dodonu** – Mataqali livaliva e dau rawa mai na sola. Na livaliva dodonu e rawa ni waqa kina na cina se yavala na iyaya lalai

**Pawa** – Na igu e solia e dua na ka ena gauna yalataki.

**Sasaga** – Oga se cakacaka bibi yalani na kena gauna, mv tara vale.

**iSoqosoqo Veivukei** – na isoqosoqo eso era vukea na itikotiko

**Ulunisola** – Vata karakarawa lumisa e vukica na cila ni siga me igu.

**iUsana** – Ka e vakayagataka na livaliva ni bateri se sola. E rawa ni cina, irinicagi se katoniwaililiwa. Ka ga e vakayagataki livaliva e iusana.

**iVakadei** – Ka e vakadeitaki kina na iyaya se gacagaca – me vaka na ililili ni itaba. E tiko talega na ivakadei ni ulunisola e dela ni vale me kua ni cagina.

**Veilunisola** – Levu na ulunisola veisemasemai

**Volt** – Kaukaua ni livaliva, cokovata kei na kui me soli pawa

**iVuki** – Ka e vukica na livaliva dodonu me livaliva dri

1

Taumada –  
Tou veikilai mada —————



## IVAKADRE 1

Vakamacalataki iko vakalekaleka vei ira na lewe ni kalasi.  
Tukuna se cava so o kila tu ena tabana ni ivurevure tudei  
kei na veika vakailavo, kei na cava so o namaka me na vua  
ni vuli qo.

2

Cava na Qaravi Vakailavo  
ni IVurevure Tudei? —————

## 2.1 IVurevure Tudei

Na IVurevure Tudei na igu e rawa mai na ivurevure tudei, me vaka ni vakavoutaki vakataki koya ena noda delanigauna, mv cila ni siga, cagi, uca, ua kei na mati, biau, kei na waikatakata.

## 2.2 Qaravi Vakailavo

Na qarava vakailavo e wili kina noda tuvatuva naka, vakaivolataka, lewā ka liutaka na veika vakailavo, me vaka na kena kau mai na kena ilavo kei na kena vakayagataki. E okati kina noda cakacakataka na yavu ni veiliutaki ena iyau vakailavo ni sasaga.<sup>1</sup> E vaka talega kina na sasaga ni ivurevure tudei, ni gadrevi kina na vakadidike me macala kina na yaga ni vakacuruilavo. E sega na lawa koula se iwalewale duadua ni vakailavotaki ni sasaga ni ivurevure tudei. Na sasaga ni ivurevure tudei yadua e gadrevi kina na ilavo kei na veika tale eso me rawailavo kina.

### YALOYALO 1: Leqa namaki ni cakacaka ni ivurevure tudei<sup>2</sup>

| Typical RE risks of the different RE technologies |                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RE type                                           | Key Risk Issues                                                                                                                                                                                                                                                                               |
| <b>Geothermal</b>                                 | <ul style="list-style-type: none"> <li>Drilling expense and associated risk (e.g. blow out)</li> <li>Exploration risk (e.g. unexpected temperature and flow rate)</li> <li>Critical components failures such as pumps breakdowns</li> <li>Long lead times (e.g. planning consents)</li> </ul> |
| <b>Solar PV</b>                                   | <ul style="list-style-type: none"> <li>Component breakdowns</li> <li>Weather damage</li> <li>Theft / vandalism</li> </ul>                                                                                                                                                                     |
| <b>Small hydro-power</b>                          | <ul style="list-style-type: none"> <li>Flooding</li> <li>Seasonal / annual resource variability</li> <li>Prolonged breakdowns due to offsite monitoring (long response time)</li> </ul>                                                                                                       |
| <b>Windpower</b>                                  | <ul style="list-style-type: none"> <li>High upfront costs</li> <li>Critical component failures</li> <li>Wind resource variability</li> <li>Offshore cable laying</li> </ul>                                                                                                                   |
| <b>Biomass power</b>                              | <ul style="list-style-type: none"> <li>Fuel supply availability / variability</li> <li>Resource price variability</li> <li>Environmental liabilities associated with fuel handling and storage</li> </ul>                                                                                     |
| <b>Biogas power</b>                               | <ul style="list-style-type: none"> <li>Resource risk</li> <li>Planning opposition associated with odor problems</li> </ul>                                                                                                                                                                    |
| <b>Tidal/wave power</b>                           | <ul style="list-style-type: none"> <li>Survivability in harsh marine environments</li> <li>Prototypical / technology risks. Various designs and concepts but with no clear winner at present</li> <li>Small scale and long lead times</li> </ul>                                              |

Source: UNEP - Financial Risk Management Instruments for Renewable Energy Projects, Summary Document, 2004

Eso na leqa namaki e laurai ena yaloyalo e cake. E dau sega so ni levu na ilavo ena vanua sasaga cake tiko baleta na cakacaka ni ivurevure tudei, e bibi gona me qaravi vakavinaka meda rawailavo kina.

## 2.3 iTuvatuva ni sasaga ni ivurevure tudei

Qo na ituvatuva makawa ni sasaga ni ivurevure tudei:

### 1. Tekivu na sasaga:

- Kila na levu ni igu gadrevi
- Kila na kena iyaubula (mv wai drodro) qai macala kina se cakacaka cava (mv ni tu na wai drodro, haidro)
- Ra duavata kece na kauwai kina, ke sega ni nona ga e le dua (mv lewenikoro)
- Kila na vanua me na toka kina.

### 2. Vakailavo:

- O cei so ena yaga vua, vica na kena isau?
- Vakailavotaki vakacava (mv: dinau e le dua, tokona na matanitu, cau na itokani ni veivakatorocaketaki)?
- So na gauna e rawa ni veiyalayalati me volitaki na vo ni livaliva ki na lawa levu.

### 3. Tara:

- O cei me na tarā (mv lewenikoro se kabani)
- Tara oti
- Vakatovolei, sevu.

### 4. Taukena, Qarava:

- Ke sa vakailavotaka na sasaga e dua na isoqosoqo, eratou na lavaki ilavo me yacova ni boko na dinau. Ni sa boko na dinau, era dau qai taukena na lewenikoro.
- Ke vakailavotaki ga ena koro, era na taukena ka qarava na lewenikoro se itaukei ni vale.
- Ke tiko na veiyalayalati ni volitaki livaliva, sa na vakau na vo ni livaliva, qai vakayagataki na kena isau me iboko ni dinau levu.

1 Management Study Guide, "Financial Management, Meaning, Objectives and Functions," <https://www.managementstudyguide.com/financial-management.htm>

2 UNEP- "Financial Risk management Instruments for Renewable Energy Projects Scoping", Summary Document, 2004, <https://wedocs.unep.org/20.500.11822/9450>

## 2.4 Tekivu na sasaga ni ivurevure tudei

Na sasaga ni ivurevure tudei na sasaga cava ga e sagai kina me rawa na igu mai na ivurevure e dau vakavoutaki ena noda delanigauna, me vaka na siga, wai, cagi &s.

Kena rawa se sega na sasaga ni ivurevure tudei vou e vakatau ena levu na tikina:

1. Cava na ivurevure ni igu?

Na ivurevure ni igu e rawa ni sola, haidro, se cagi, baleta na sasaga lalai. E vakatau se da tiko e vei kei na iyaubula cava e tu vei keda.

### YALOYALO 2: iGu Sola<sup>3</sup>



### YALOYALO 3: iGu Haidro<sup>4</sup>



2. E vica na igu e gadrevi?

Qo e kilai mai na levu ni igu e gadrevi ena dua na vuvale, kei na iviliwili ni vuvale era gadreva na igu. Dua mada, na sasaga lailai ni sola e rawa ni yadua na sola e veivale, se rawa ni dua taucoko na sola baleta na vale kece ena koro.

3. Na ivurevure ena colata rawa na igu e gadrevi?

E vinaka meda kila se vica na igu e rawata na ivurevure. Ke sola, ena sega na leqa, ni rawa ni yadua na sola e veivale, ia ke haidro, me sota na kui ni wai kei na igu e gadrevi ena vuvale se koro.

4. Ena vica na kena gumatua?

E rawa ni kilai na gumatua e gadrevi ena noda dikeva na igu e gadrevi ena vale yadudua qai soqoni vata.

5. Ena vica na kena isau?

Ni sa macala na igu gadrevi kei na kena icakacaka (mv sola se haidro), me qai kerei na vakatutu (quotation) vei ira na kena kabani. Ena tiko ena Tabana ni Livaliva (Dept of Energy) na yacadra na kabani nuitaki.

6. Vakailavotaki vakacava?

O ira ga na lewenikoro, se rawa nira kere veivuke ni matanitu se isoqosoqo (liganicau).

7. Vica na kena dede qai 'saumi koya'?

'Saumi koya' na kena ibalebale me saumi tale na ilavo vakacurumi. Da kaya mada, sa dua nomu sola, na isau ni kena vakadurī e \$500. Ni sa tekivu yavala, o sa vakabula e \$10 e veivula na isau ni benisini. Ena dua na yabaki o na vakabula kina e \$120. Na dede gona ni nona saumi koya e:

$$\text{Payback Period (years)} = \frac{\text{Total installation Cost}}{\text{Yearly Cash inflow}}$$

$$\text{Payback} = \frac{\$500}{\$120} = 4.16 \text{ years} \quad (4 \text{ years, 1 month and 28 days})$$

Ia, kevaka o sa dinau kina, sa sega tale ni kena isau e \$500. Kevaka e kena tubu e 20% e veiyabaki me yabaki lima, sa na tubu kina na isau ni bokoboko me:

$$\text{Interest cost per year} = \frac{\text{interest\%}}{100} \times \text{Loan amount}$$

$$\text{Interest per year} = \frac{20}{100} \times 500 = \$100 \text{ per year}$$

<sup>3</sup> Ivurevure: Europe for Culture, 2018, <http://anoeuropeu.patrimoniocultural.gov.pt/index.php/resultados-do-ano-europeu-do-patrimonio-cultural-2018/>

<sup>4</sup> Ivurevure: The Conversation, <https://theconversation.com/rivers-rain-and-releases-what-happens-when-you-dam-a-waterway-3934>



## IVAKADRE 2

1. Nomu (7 e cake) dinau kei na kena tubu sa \$1000. Ni ilavo bula e veiyabaki e \$120, fikataka na dede ni nona 'saumi koya'.

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## IVAKADRE 3

1. Sa bosei vakoro ni vinakati na ivurevure tudei ni koro. Qo na igu gadrevi:

- E 10 na vuvale ena koro
- Na vale yadua e gadrevi kina na igu e 50 watt
- Na vale yadua ena vakalivaliva dodonu ga (DC) baleta na cina kei na retio

Na wai e drodro e yasa ni koro. Sa kunea o turaganikoro dua na ivola vakamacala ni Tabana ni Livaliva e tu kina e so na itukutuku ni ivurevure tudei kei na kena isau. Qo na itukutuku:

- Na isau ni dua na pikohaidro 600W (ivocevoce kei na idini) e \$700
- Na isau tale eso me cici kina na pikohaidro (waya, bateri, idoladola) e \$1300
- Na isau ni ulunisola 75W, bateri, kei na idoladola e \$180, oka kina kena vakadurī.

Na vale yadua ena koro e dau sauma e veimacawa e \$5 me ka ni cina kei na \$2 me ka ni bateri ni retio.

Iko sa matataka nomu koro ena vuli qo, sa kere ivakasala gona vei iko o turaganikoro:

- i. Vica taucoko na levu ni igu e gadrevi ena koro?

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- ii. Sa na vica na dede ni nona saumi koya ke lewa me saumi na sola ena dinau mai na baqe 20% kena tubu e veiyabaki me yabaki 5?

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iLavo e rawa ni kerei————



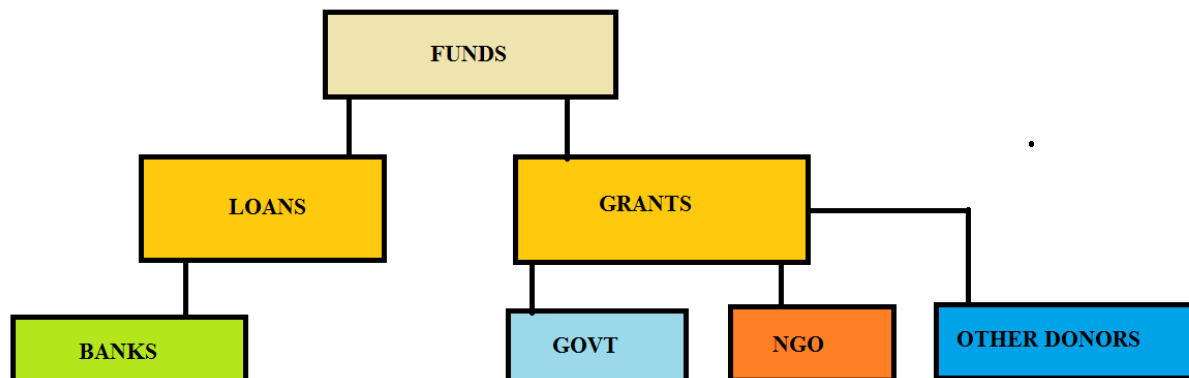
E rua na sala ni rawa ilavo ni sasaga. E rawa nida sauma vakataki keda, se kerea mai na dua na vanua.

Noda sauma vakataki keda, e vaka meda sauma e dua na sola ni vale, se me ra kumuni ilavo na lewenikoro me dua na pikohaidro se cava.

Ia na ilavo kerei eda kerea qai kevaka e vakadonui e soli vakacau se vakadinau.

Na dinau na ilavo me na saumi tale vata kei na kena tubu. Na cau (grant) na ilavo e soli wale, sega ni saumi lesu. E laurai ena yaloyalo e ra na ivurevure eso ni dinau kei na cau.

#### YALOYALO 4: Dinau kei na Cau<sup>5</sup>



### 3.1 Dinau

Na dinau ni sasaga lalai e rawa ni kerei mai na baqe ni noda vanua se baqe ni vanuatani. Ia na baqe vakaitaukei e dau gadreva e dua na kena ivakadei. Na ivakadei na noda iyau e rawa ni vesuka na baqe kevaka eda sega ni bokoca taucoko na dinau.

#### YALOYALO 5: Era dau dinau talega na kabani, sega ni o keda yadudua ga<sup>6</sup>



### 3.2 Cau

E so na ivurevure ni cau vakailavo qo:

#### 3.2.1 Matanitu

Na matanitu e dau kere cau talega, se vakayagataka na ilavo ni vakacavacava me ivurevure ni cau baleta na sasaga ni ivurevure tudei. Ni sa tiko na ilavo me cau kina, e dau kacivaka na matanitu ena TV se retio meda kerea.

<sup>5</sup> Ivurevure: GGGI, Fiji.

<sup>6</sup> CBS Power Solutions, May 2021, <https://www.worldbank.org/>

### 3.3 iSoqosoqo

Na isoqosoqo eso era dau cau ena sasaga ni ivurevure tudei. Qo eso na isoqosoqo ena Pasifika e rawa nida kere cau vakailavo kina:

#### 3.3.1 Korea International Cooperation Agency (KOICA)

Na KOICA e dau cau vakalevu ena Pasifika baleta na sasaga lelevu lalai, oka kina na livaliva, tikobulabula kei na vuli. Qo na ulutaga e dau cau vakalevu kina na KOICA:

- Vakaduri lawa lalai ni livaliva
- Veisoliyaka na sola ni vale
- Veisoliyaka na sitovu savasava
- Tokona na cakacaka ni ivurevure tudei, vb sola kei na haidro
- Vakaduri idini ni livaliva sema kei na lawalevu
- Vakaduri isoqosoqo e tokona na ivurevure tudei
- Vakadewataka se veisoliyaka na sala me torocake kina na buliyaya
- Toroya caka na vakatakata
- Veituberi kei na veitokoni ni vakadidike kei na buli yaya vovou

Mo tarai iratou ena nodratou valenivolavola ni Pasifika e Suva se ratou vakailavotaka vakacava na sasaga ena Pasifika, me macala kina se rawa ni vakailavotaki nomu sasaga vakaturi.

#### YALOYALO 6: Veilunisola vakailavotaka na KOICA mai na USP e Suva<sup>7</sup>



#### 3.3.2 The Department of Foreign Affairs and Trade Australia (DFAT)

Na inaki ni Tabana ni Vanuatani mai Ositerelia me vukei ira na matanitu sasaga cake tiko, vakalailaitaka na dravudravua, ka rawata na torocake tudei. E dau soli vakasala kei na veitokoni vei Minisita kei Vunivola Tudei ena veivakatorocaketaki, ka tuvanaka ka vakatulewataka na sasaga ni valuti ni dravudravua ena veitauriliga kei na matanitu sasaga cake tiko.<sup>8</sup>

#### 3.3.3 Climate Change Fund (CCF) (Asian Development Bank (ADB))

Na CCF (ilavo ni draki veisau) a tauyavu ena Me 2008 me tubu kina na vakailavotaki ni matanitu sasaga cake ena nodra sotava na vua ni draki veisau kei na kena revurevu. Na CCF na usutu ni cakacaka ni veitabana ni ADB me saqati kina na draki veisau ena veivuke vakenadau (technical assistance, TA) kei na cau vakailavo.<sup>9</sup>

#### 3.3.4 Global Environment Facility (GEF)

E dau vakailavotaka vakalevu na GEF na sasaga ni matanitu. E levu na tabana me nanumi nida vaqara cau mai na GEF. De na yaga mo raica kina nodratou mataveilawa (<http://www.thegef.org/about/funding>), se tarogi iratou na vakailesilesi ni matanitu.<sup>10</sup>

#### 3.3.5 NZ AID or Ministry of Foreign Affairs and Trade (MFAT) New Zealand

Na Tabana ni Vanuatani ni Niusiladi (MFAT, yacana e liu na NZ AID) e dau vakalavotaka na sasaga vakoro ena Pasifika. Na tabana qo e veitauriliga kei na 30 tale na tabana ni matanitu ena veivuke ena veivakatorocaketaki ena Pasifika raraba.<sup>11</sup>

#### 3.3.6 Matabose kei Urope (European Union)

Na Matabose qo e dau vakailavotaka na kabani qaravi tobu ni ilavo, baqe se kabani ni ilavo, se o koya ga se isoqosoqo cava e via tauyavutaka na tobu ilavo ni igu savasava, se vakatubura na tobu sa tu rawa me qaravi kina na igu savasava.

7 Ivurevure: Asia Pacific Report, "Solar panels the way to go for Pacific, says USP physics academic", <https://asiapacificreport.nz/2018/04/18/solar-panels-the-way-to-go-for-pacific-says-usp-lecturer/>

8 Australian Government Department of Foreign Affairs and Trade, <https://www.dfat.gov.au/>

9 Asian Development Bank, "Climate Change Fund", <https://www.adb.org/what-we-do/funds/climate-change-fund>

10 Global Environment Facility (GEF), "Least Development Countries Funds-LDCF", <https://www.thegef.org/topics/least-developed-countries-fund-ldcf>

11 New Zealand Foreign Affairs & Trade <https://www.mfat.govt.nz/en/>



4

iLavo rawa kei na ilavo  
vakayagataki ni sasaga ni  
ivurevure tudei —————

## 4.1 Sasaga ni ivurevure tudei

Ena sasaga ni ivurevure tudei, e waserua na ilavo – rawa kei na vakayagataki.

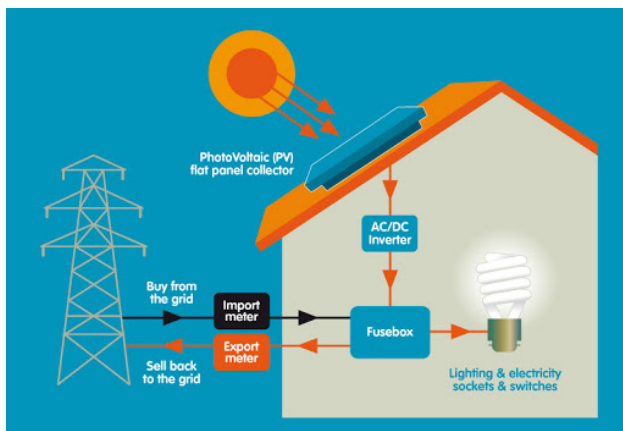
## 4.2 iLavo Rawa ni iVurevure Tudei

Na ilavo rawa na ilavo e rawata mai se vakabulā. Da kaya mada, ni dua noda sola, sa sega ni saumi na livaliva. Eda sa mai vakabulā kina e \$50 e veivula ena voli disili ni idini se saumi livaliva mai na lawalevu, na ilavo bula gona qori sa wili me ilavo rawa.

Ena so na sasaga talega vakoro, e dau lavaki me saumi na livaliva e veivale, qori sa na wili me kena ilavo rawa.

Ke mani sema na sola ena lawalevu, ena rawa ni volitaki na livaliva, qai rawa kina na ilavo me kena isau.

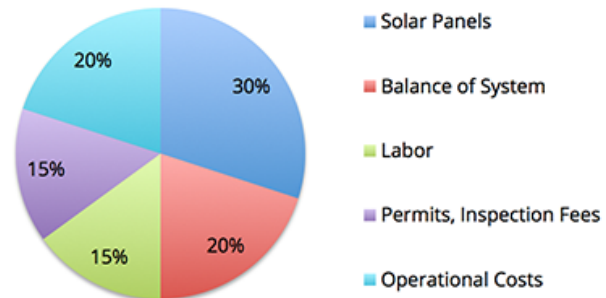
### YALOYALO 7: Sema na sola ina lawalevu e rawa ni volitaki na livaliva<sup>16</sup>



## 4.3 Mataqali iLavo Vakayagataki

E levu na ka me saumi ena sasaga ni ivurevure tudei. Na ka saulevu duadua na kena vakadurī. Ni sa duri oti tu, ena tiko ga na ka me saumi.

### YALOYALO 8: iSau eso ni sola<sup>17</sup>



Na isau levu duadua kena vakadurī. Tou dikeva mada se cava so me na saumi ena sasaga ni ivurevure tudei:

- iSau ni tauyavu: Qo e wili kina na isau ni kena droinitaki, voli kena iyaya, kei na isau ni cakacaka kei na usausa.

### Yaloyalo 9: Saulevu na tauyavu ni haidro ni gadrevi kina me tara na baniwai<sup>18</sup>



iSau ni kena qaravi. Qo na ilavo e gadrevi me cici vinaka kina na sasaga ni ivurevure tudei ni sa duri oti tu. E dua mada, na idini disili ni koronivuli ena wili me isau ni kena qaravi na ivoli ni disili.

Me wili talega na isau ni cakacaka ni kena qaravi na sasaga ni cici tiko.

- iSau ni kena vakavoutaki: Qo e kune vakalevu ena sasaga ni ivurevure tudei, qai rawa ni sivia na isau ni kena qaravi. E dau vakalevu me yaco vagauna, e gadrevi gona kina me lewe ni tuvailavo ni sasaga, me tu vakarau kina na kena isau. Kaya mada, ni sa duri tu na sola, ena dua beka na bateri vou ena veiyatolu na yabaki. De na saumi e dua na kena dau me mai dikeva se me vakavinakataki se vakavoutaki.

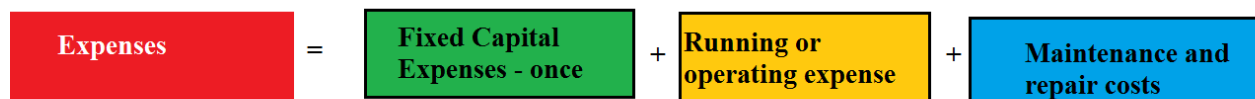
<sup>16</sup> Yavutaki ena RJ SOLAR, "What is Solar PV and how does it work?", <http://www.rjsolar.co.uk/>

<sup>17</sup> VU PHONG, "How much does a Solar Power System Cost?", <https://vuphongsolar.com/how-much-does-a-solar-power-system-cost/>

<sup>18</sup> Panasian Power, <http://panasianpower.com/>

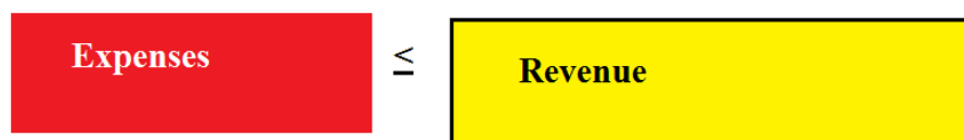
Sa macala gona ni waseitolu na vakayagataki ilavo ena sasaga.  
 E rawa ni soqoni vata me dua.

#### YALOYALO 10: Soqoni ni iLavo Vakayagataki<sup>19</sup>



Na usutu ni vakasama ni sasaga ni ilavo rawa e dodonu me  
 tini sivia na ilavo vakayagataki, se me rau tautauvata.

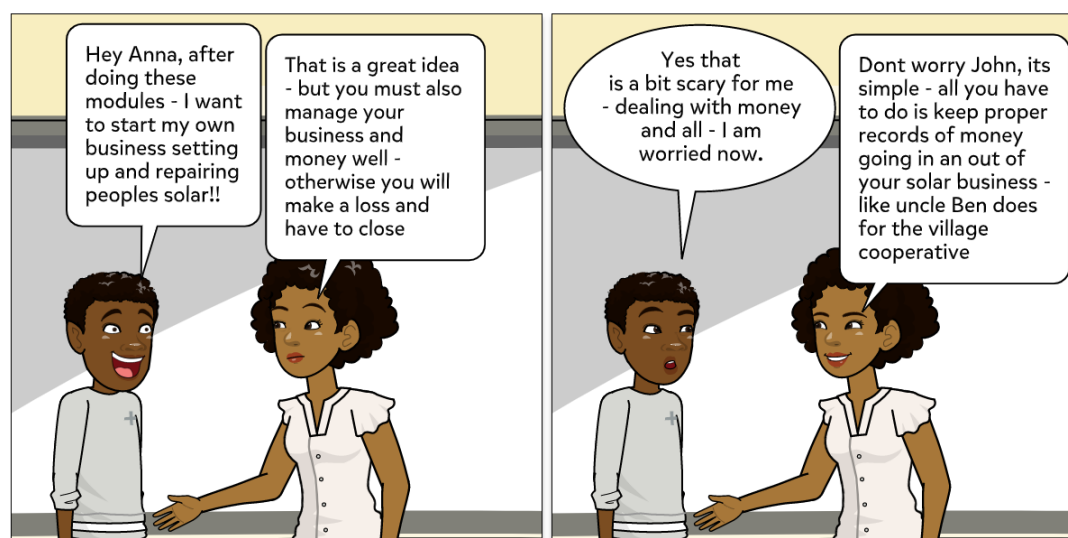
#### YALOYALO 11: iLavo rawa me sivia na ilavo vakayagataki, se tautauvata<sup>20</sup>



## 4.4 Daunifika Rawarawa

E bibi sara na daunifika ena levu na bisinisi kei na sasaga.  
 De tiko e nomu yasayasa na mataveivoli (cooperative), se o  
 lewena e dua. O bau kila se vakaivolataki vakacava na kena  
 veivoli?

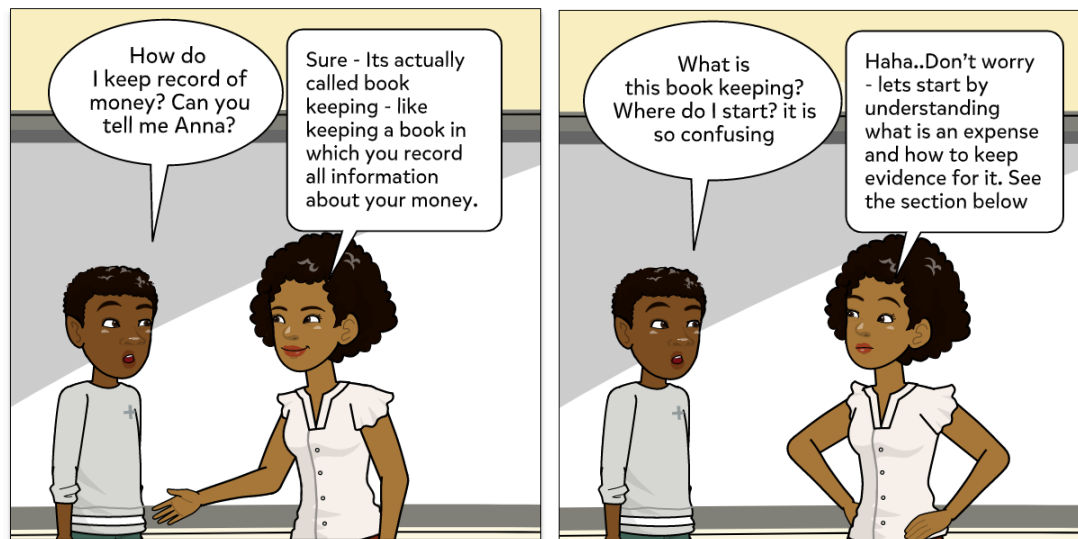
Me dua mada nodatou drama lekaleka – se me wiliki ga  
 nodrau veivosaki o Anna kei John e ra qori.



19 GGGI, Fiji

20 GGGI, Fiji



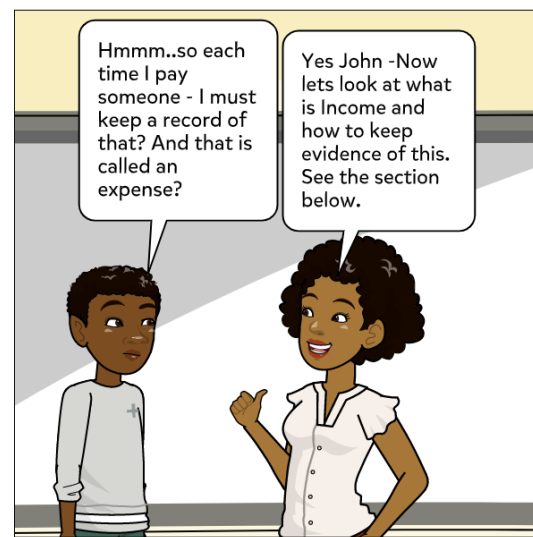


#### 4.4.1 ilavo Vakayagataki

Nida dau volia e dua na ka (baleta na bisinisi se sasaga), wili kina na ivodovodo ni boto se ilavo ni veisaumi – gauna cava ga eda vakayagataki ilavo baleta na bisinisi se sasaga, qori na ilavo vakayagataki. Me dau maroroi talega na kena ivola vakadinadina de na gadrevi mai muri me lesuvi.

#### 4.4.2 Vakadinadina ni vakayagataki ilavo

E dua mada, nida volia e 15 na matanicina LED mai na sitoa ni matai mai taoni na yacana na Super Hardware ena \$40 – eda saumi itaukei ni sitoa eda qai kauta mai na koro na matanicina. Ia e vei na kena ivakadinadina? E ka bibi gona meda dau KERE RISITI. Na risiti (se dokete) na ivola vakadinadina ni noda veivoli.



#### YALOYALO 12: Sabolo ni risiti – ivakadinadina ni veivoli<sup>21</sup>

|                 |      |                                   |          |
|-----------------|------|-----------------------------------|----------|
| <b>RECEIPT</b>  |      | DATE _____                        | NO: 1234 |
| RECEIVED FROM   |      | John                              |          |
| ADDRESS         |      | Rock Island                       |          |
| FOR             |      | 15 LED LIGHT BULBS                |          |
| AMOUNT          |      | \$40                              |          |
| AMT. OF ACCOUNT | 40   | <input type="radio"/> CASH        |          |
| AMT. PAID       | \$40 | <input type="radio"/> CHECK       |          |
| BALANCE DUE     |      | <input type="radio"/> MONEY ORDER |          |
|                 |      | BY Super Hardware                 |          |

Se mataqali risiti cava, e yaga vakalevu me ivolatukutuku ni noda bisinisi. Na risiti e dau vakalevu me vakanaba – ena tiko vei iratou na kena lavelave naba vata, de da vaqaqā vakamalua. Na risiti e cake e kena naba na “1234”.

#### 4.4.3 ilavo Rawa

Ni dua e soli ilavo vei keda me ka ni bisinisi, e vakatokai me 'ilavo rawa'. Me vaka ni dau soli vei keda na risiti – o keda talega me dua noda ivolanirisi me dau soli vei ira era soli ilavo vei keda me ka ni bisinisi. Da kaya mada, nida volitaka e dua na matanicina 5W vei Tall Tom – da vola na risiti ena kena ivola, solia vei Tom, qai maroroya kena lavelave me noda. E muri ena volai na lavelave ni risiti ena ivolanilavo. E levu na ivolanirisi e volai na kena naba ena iqi damudamu. Na naba qori e yaga me vakaivolataki nida via lesuva e dua na ka baleta na veivoli.

YALOYALO 13: Sabolo ni risiti tauri mai na kena ivola<sup>22</sup>

**RECEIPT**  
**0008**

No. \_\_\_\_\_ DATE 26/06/2021

RECEIVED FROM TALL TOM  
-FOR ONE 5W LIGHT BULB

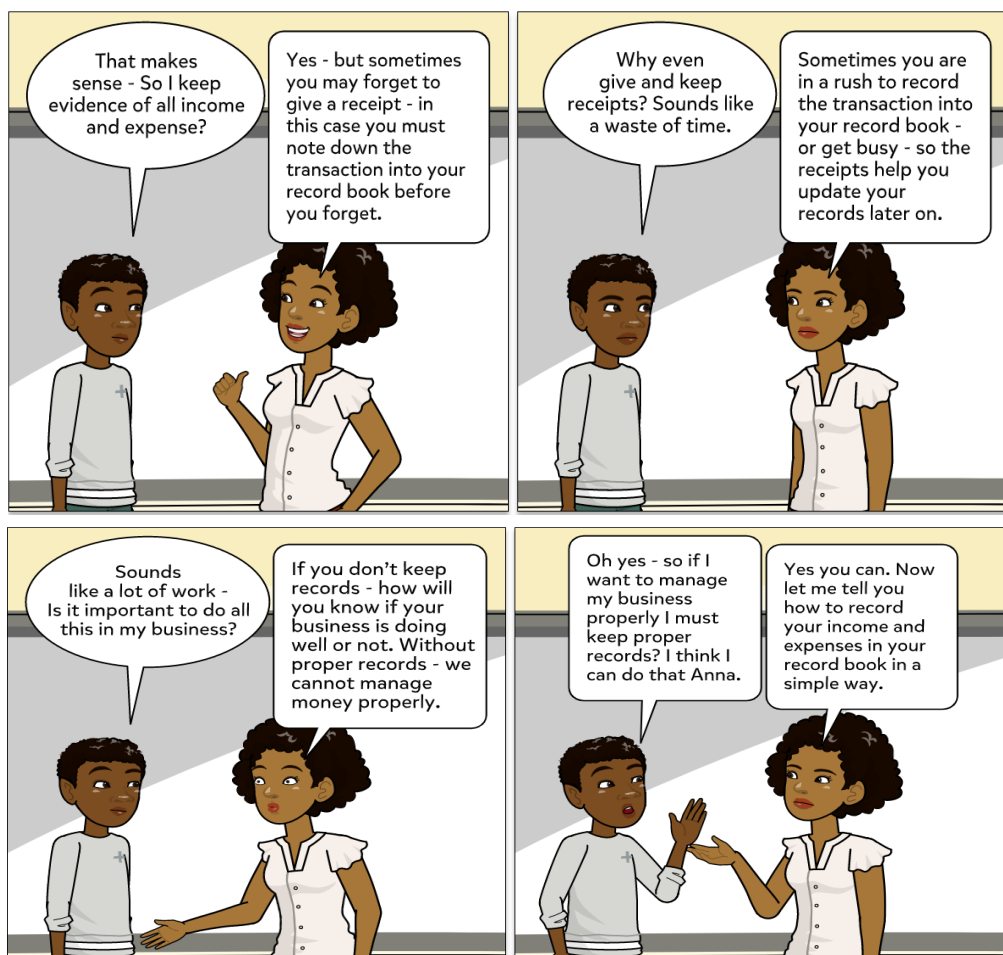
THE SUM OF \$5.00

CHEQUE \_\_\_\_\_

CASH 5 - 00

DISCOUNT \_\_\_\_\_

JOHN





#### 4.4.4 Daunifika Rawarawa

E levu tu na icakacaka ni daunifika. Koya e rawarawa duadua e volai ga vakadua na veivoli (single entry), eda musuka na ilavo vakayagataki mai na ilavo rawa.

##### YALOYALO 14: Teveli ni daunifika rawarawa<sup>23</sup>

| DATE | DESCRIPTION | RECEIPT NUMBER | INCOME \$ | EXPENSE \$ | ACCOUNT BALANCE |
|------|-------------|----------------|-----------|------------|-----------------|
|      |             |                |           |            |                 |
|      |             |                |           |            |                 |
|      |             |                |           |            |                 |
|      |             |                |           |            |                 |

Na yatu e dui volai kina e cake se cava me volai kina. Sa bau rawarawa sara – Da kaya mada ni solia o tamai John e \$100 vei luvena me tauyavu kina nona bisinisi ni volitaki sola kei na

vakaduri sola – na ilavo qo e ilavo rawa se ilavo vakayagataki? lo sa macala, na ilavo rawa. Me vakaivolataki sara.

##### YALOYALO 15: Sabolo ni volai ni ilavo rawa ena ivolanilavo ni bisinisi<sup>24</sup>

| DATE     | DESCRIPTION                      | RECEIPT NUMBER | INCOME \$ | EXPENSE \$ | ACCOUNT BALANCE |
|----------|----------------------------------|----------------|-----------|------------|-----------------|
| 15/05/21 | Cash from Dad for Business start |                | 100       |            | 100             |
|          |                                  |                |           |            |                 |
|          |                                  |                |           |            |                 |
|          |                                  |                |           |            |                 |

Na imatai ni laini ena ilavo rawa e \$100, koya a solia o tamai John me tauyavu kina na bisinisi ni sola. Qo e vakatokai me 'yavu'. Ni sa volai oti na imatai ni laini sa macala kina na levu ni ilavo ni akaude. Oti me vakacuruma na ilavo e vakayagataka o John ni volia e 15 na matanicina kena isau e \$40 mai na

Super Hardware. Nanuma tiko eda dau kuria na ilavo rawa, musuka na ilavo vakayagataki. Ena so na kena icakacaka e dau volai na itoqa ni musu (negative, subtract, minus) ena ilavo vakayagataki. Raica na kena icakacaka ena Yaloyalo 16 e ra.

##### YALOYALO 16: Vakacurumi na ilavo vakayagataki kei na ilavo e vo<sup>25</sup>

| DATE     | DESCRIPTION                         | RECEIPT NUMBER | INCOME \$ | EXPENSE \$ | ACCOUNT BALANCE \$ |
|----------|-------------------------------------|----------------|-----------|------------|--------------------|
| 15/05/21 | Cash from Dad for Business start    |                | 100       |            | 100                |
| 20/06/21 | Bought 10 bulbs from Super Hardware | 1234           |           | 40         | 60                 |
|          |                                     |                |           |            |                    |
|          |                                     |                |           |            |                    |
|          |                                     |                |           |            |                    |

Subtract expense from account balance

Sa musu na ilavo vakayagataki e \$40 mai na ilavo se vo tu ena akaude, e \$100. Sa qai vo e \$60, me vaka sa volai ena laini vata ena ulutaga 'ilavo vo' (account balance). Oti, vacava ni sa volitaka o John e dua na matanicina vei Tall Tom. Raica

na risiti e cake a solia o John vei Tall Tom, ni a volia o Tall Tom e dua na matanicina ena \$5. E volai vakamatata na veivoli qo ena Yaloyalo 17.

23 GGGI, Fiji

24 GGGI, Fiji

25 GGGI, Fiji

**YALOYALO 17: Vakacurumi tale na ilavo rawa, volai tale na ilavo e vo** <sup>26</sup>

| DATE     | DESCRIPTION                         | RECEIPT NUMBER | INCOME \$ | EXPENSE \$ | ACCOUNT BALANCE \$ |
|----------|-------------------------------------|----------------|-----------|------------|--------------------|
| 15/05/21 | Cash from Dad for Business start    |                | 100       |            | 100                |
| 20/06/21 | Bought 10 bulbs from Super Hardware | 1234           |           | 40         | 60                 |
| 26/06/21 | Sold one 5W bulb to Tall Tom        | 8              | 5         |            | 65                 |
|          |                                     |                |           |            |                    |
|          |                                     |                |           |            |                    |

Add income to account balance on above line

Sa vakurī ena \$5 na ilavo e vo, mani kena isoqoni e \$65.  
 Me laurai mada na Yaloyalo 18, ni sa vakacuruma o John na veivoli kece ni dua na vula.

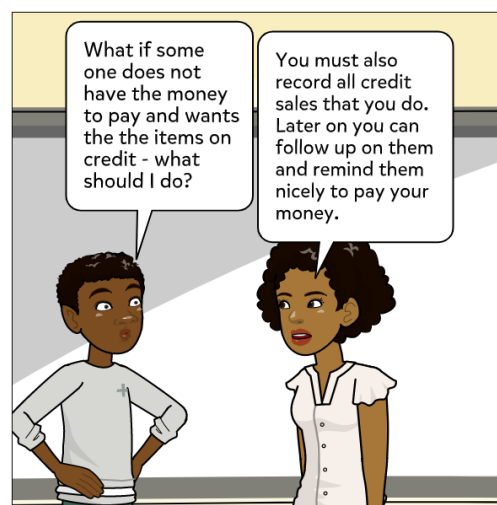
**YALOYALO 18: Sabolo ni ilavo e vo ni dromu na vula** <sup>27</sup>

| DATE     | DESCRIPTION                              | RECEIPT NUMBER | INCOME \$ | EXPENSE \$ | ACCOUNT BALANCE \$ |
|----------|------------------------------------------|----------------|-----------|------------|--------------------|
| 15/05/21 | Cash from Dad for Business start         |                | 100       |            | 100                |
| 20/06/21 | Bought 10 bulbs from Super Hardware      | 1234           |           | 40         | 60                 |
| 26/06/21 | Sold one 5W bulb to Tall Tom             | 8              | 5         |            | 65                 |
| 29/06/21 | Sold six 5W bulbs to village cooperative | 9              | 30        |            | 95                 |
| 29/06/21 | Paid Pita to deliver the bulbs to store  |                |           | 5          | 90                 |
| 30/06/21 | Balance at end of June                   |                | 135       | 45         | 90                 |

Ni dau dromu na vula, eda dau raica na ivolanilavo se vacava tiko na itosotoso. Eda soqona kece na ilavo vakayagataki qai vola ena laini vata e volai kina na ilavo e vo ni dromu na vula. Ena kena qo, sa laurai kina ni o John sa rawata e \$135 qai vakayagataka e \$45. Nida musuka na ilavo vakayagataki mai na ilavo e rawa, sa kune kina na levu ni tubu. Ena bisinisi nei John: \$135 musu e \$45 sa \$90 na kena vo, se nona tubu.

E so na gauna, e sega ni wili na 'yavu' me ilavo rawa. Koya gona, kevaka eda okata ga na veivoli ni vula o June ena bisinisi nei John, qai sega ni okata na \$100 – sa \$45 na ilavo vakayagataki, \$35 na ilavo rawa. Ena vula gona ya, e lusi kina e \$10. E yaga meda dikeva na tubu e veivula me matata kina na itosotoso.

Nida vakaivolataka vakavinaka na veivoli, eda kila kina na itosotoso ni bisinisi.



<sup>26</sup> GGGI, Fiji

<sup>27</sup> GGGI, Fiji



## IVAKADRE 4

Wilika na italoano qo qai vakaivolataka vakavinaka vakadaunifika. Rawa ni veivuke o dauveituberi. E rawa nio lesuva na ivakamacala ni daunifika mo rawata kina na ivakadre qo. Qo e dua na ivakadre yaga sara ena bisinisi lailai se sasaga.

“Dua na sasaga lailai ni koro sa bucini tiko ena dua na koro volekati Savusavu. Era lomavata kina na lewenikoro me dua na mataveivoli baleta nodra sola. Na isau ni sola ena viafia ya \$300. Na ulunisola (panel) e rawa kina ya 300W. E vinakati e 3000W baleta na koro taucoko. Gadrevi talega na bateri tu vakawawa, rauta ni 10 na bateri ya 100Ah. Na isau ni bateri e rauta ni ya \$450. Na isau ni waya kei na gacagaca tale eso e rauta ni \$2000, wili kina na cina lalai ni 10 na vale. Era kaya na kenadau ni rawa ni vakaduŕi ena 7 na siga. Sa na vinakati

gona e 3 na kenadau me ratou ya \$50 dua na siga, me 7 na siga. Sa na veitokoni na matanitu ena kena vakadurī, nona cau e \$10,000. Sa na via sosomitaki na bateri ni oti e yabaki 7, sa mani lewa kina na matabose ni koro me lavaki e ya \$2 dua na vula ena 10 na vale, me saumi kina na bateri vou kei na veiqaravi tale eso. Na veivula ya 6 me dua na kena dau me dikeva na sola, kena isau e \$220.

O iko na kena daunifika. Sagā mo vakaivolatata vakavinaka na itukutuku vakailavo ni matai ni vulaono ni sasaga. Oti, dikeva na kena ivolanilavo se vinakati me tubu nodra cau na vale yadua ena mataveivoli se sega. Sa na rauta na ya \$2 dua na vula me garavi vakadede kina na sola?

[illegible]

## TALANOA DIKEVI: Dikevi vakailavo e rua na lawa lalai sola

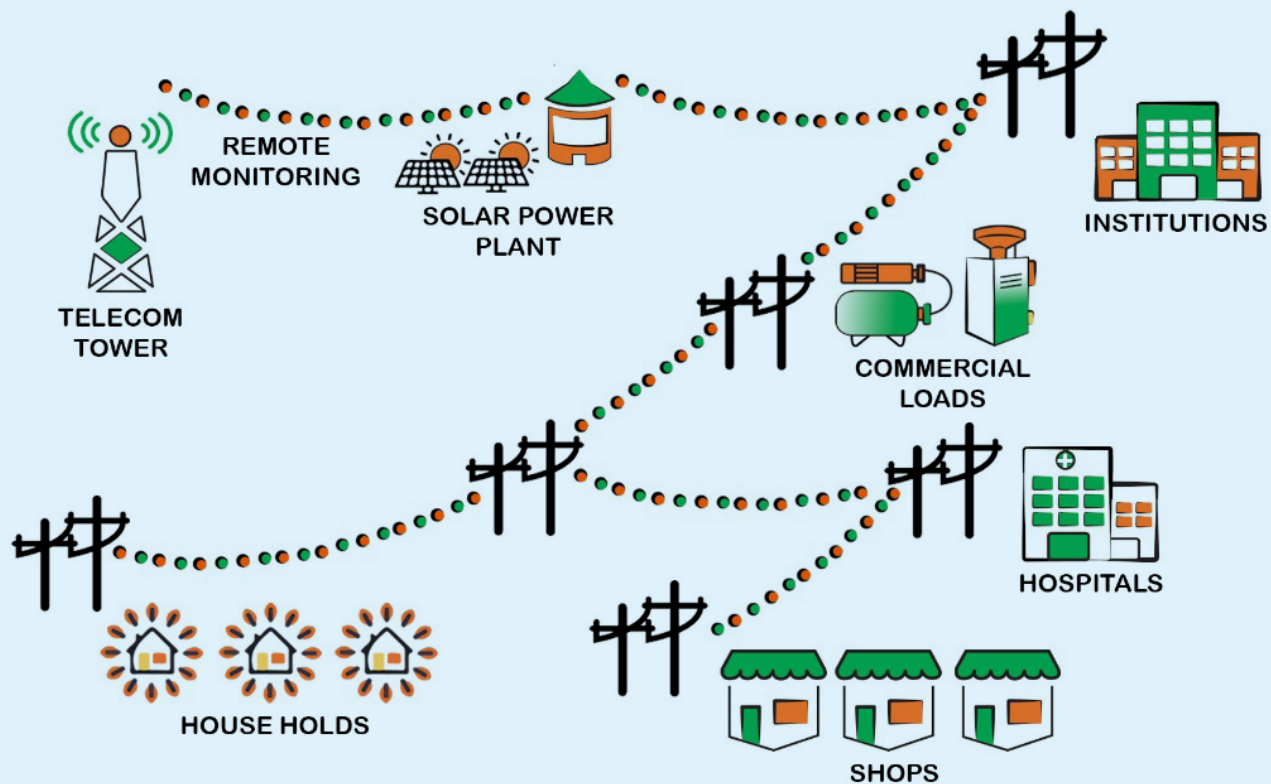
Qo na vakadidike ni veika vakailavo baleta na lawa lalai sola e Viti, wili kina na ivakamacala matata ni ka bibi eso me nanumi me dei kina vakailavo na lawa lalai sola eda via vakaduria ena koro.

E dau saulevu sara na vakadrodoro livaliva mai na lawa levu ena so na vanua dredre, baleta na kedra yawa, dredre ni vanua (ulunivanua, uciwai &s) se sega ni rawa vei ira na koro e bati ni waitui. Mera qai vakalivalivataki vakacava na vanua dredre qori? Kena isau na lawa lalai (mini-grid system).

Tou sa veitalanoataka na lawa lalai sola ena leseni ni sola, ia qo me datou dikeva na tabana vakailavo. Me datou vaqagā se cava so na kena dredre vakailavo ena kena vakadurī kei na kena qaravi, ia na tikina bibi duadua, se cava nodra itavi na lewenikoro me cici balavu kina.

A lawa lalai sola e vakayagataki kina na livaliva dri (AC) me rauta e dua taucoko na koro, sega ni dua ga na vale.

### YALOYALO 20: Lawa lalai sola<sup>29</sup>



29 Ivurevure: <https://www.tauria.com/mini-grid-model/>, Accessed on 4/11/2020

Na livaliva e soli e tautauvata kei na kena mai na lawa levu e dau kune ena veitaoni, e rawa gona ni cicivaki kina na veimataqali iyaya livaliva, yalani beka ga me kua ni sema kina na iyaya lelevu sara de qai sivia tale se vakacacani kina na lawa. E so e vakamita me wilika na livaliva ni dui vale me qai saumi.

E yaga vakalevu na ilavo e rawa mai na mita, ni dau vakalevu me nodratou na itaukei ni lawa lailai se na kena komiti, qai saumi kina kena vakadurī, qaravi se vakavoutaki, se na veika tale eso me cici vinaka kina na lawa.

Me datou dikeva vata e rua na lawa lalai sola. Tou na vakatokā me **"A"** kei na **"B"**. Me datou dikeva mada vakamatailelevu na veika vakailavo, kedrau dui ituvatuva, kei na leqa eso e sotavi ena kedrau vakadurī, qaravi kei na vakavoutaki. Oti, tou na veivosakitaka se cava so na itavi ni lewenikoro me lailai kina na leqa se me walī ena vukudra na lewenikoro kece. Nanuma ni lawa ni livaliva qo e yaga dina vei ira kece na lewenikoro.

| Cava                            | A                  | B                   | Vakamacala                                                                                                                                                                                                                |
|---------------------------------|--------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>iTuvatuva</b>                |                    |                     |                                                                                                                                                                                                                           |
| <b>Gumatua ni sola</b>          | 5 kW               | 50 kW               | Qo na isoqoni ni gumatua ni ulunisola.<br>(1 kW = 1000 watt)                                                                                                                                                              |
| <b>Gumatua ni Beteri</b>        | 45 kWh             | 200 kWh             | Qo na isoqoni ni gumatua ni kena bateri sola.                                                                                                                                                                             |
| <b>Idini Disili Tuvakawawa</b>  | 10 kW              | 60 kW               | Qo me vuke ena jajitaki bateri ena draki ca balavu, ni guce kina na ulunisola.                                                                                                                                            |
| <b>Levu ni vale qaravi kina</b> | 50                 | 50                  | Qo na isoqoni ni vale era vakalivaliva ena lawa lailai sola.                                                                                                                                                              |
| <b>Veika Vakailavo</b>          |                    |                     |                                                                                                                                                                                                                           |
| <b>iSau ni sasaga</b>           | \$250,000 FJD      | \$2.0 milioni FJD   | Qo na isoqoni ni isau ni kena vakadurī na sola.                                                                                                                                                                           |
| <b>iVurevure ni ilavo</b>       | Cau                | Cau                 | Na 'cau' e kena ibalebale ni a cau mai na matanitu se dua na isoqosoqo, era sega ni sauma na lewenikoro.                                                                                                                  |
| <b>iSau ni livaliva</b>         | \$2.00 FJD / uniti | \$0.50 FJD / uniti  | Qo na kena isau era sauma na vale yadudua. Levu ni uniti e vakayagataki, levu ni bili me saumi. (1 unit = 1 kWh)                                                                                                          |
| <b>iLavo rawa taucoko</b>       | \$9,600 FJD/yabaki | \$12,000 FJD/yabaki | Qo na ilavo taucoko e rawa e veiyabaki mai na vale yadudua me isau ni livaliva vakayagataki. (Qo e sega ni dei, ena vakatau ena levu ni livaliva e vakayagataki)                                                          |
| <b>iSoqoni</b>                  | \$2,400 FJD/yabaki | \$3,000 FJD/yabaki  | Qo na isau ni voli disili kei na kena kau mai, isau ni qaravi sola kei na kena vakavoutaki (wili kina kedra isau na liga ni veiqaravi, yadrayadravi, kumuni ilavo), isau ni veilawa (internet), ivodovodo nei kenadau &s) |
| <b>Tubu</b>                     | \$7,200 FJD/yabaki | \$9,000 FJD/yabaki  | Qo ni musu na ilavo vakayagataki mai na ilavo rawa.                                                                                                                                                                       |

**Dua na kena veivosaki**

O dauveituberi me wasewasei ira na lewe ni kalasi qai vakavure veivosaki baleta na teveli e ra. Rawa ni tekivu ena so na kena ivakaraitaki yavutaki ena lewe ni “Kena iwali”, me kua

ga ni cavuti kece de qai mate kina na veivosaki. Vakauqeti ira na iwasewase mera dui vakasama, qai vakatura e so na iwali bau manata, wili kina na kena e volai tu e ra. E sega ni dua na “kena isau dodonu”, ni duidui kece na koro kei na nodra dui ile.

| Me veivosakitaki                                                                                                                                                                                                                                                                   | Kena iwali                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. E saulevu sara na sasaga (A: \$250,000, B: \$2.0 Milioni). E dredre sara me dua na koro e rawata na ilavo qo. E dredre talega na dinautaka, qai sega ni macala se na boko rawa.                                                                                                 | <ul style="list-style-type: none"> <li>• Meda kila ni veivakacegui vakalevu na cau (grant) ni rawa ni dua kina noda sola sega ni saumi, ke a sega na cau ke a sega na sola.</li> <li>• Ke sa dua rawa nomudou sola, dou sa kalougata saraga, e nomudou itavi na qarava vakavinaka. Nanuma tiko ni levu na koro se bera ni nodra na kena madigi, era se vakararavi ena cina rama ca kei na livaliva saulevu.</li> <li>• Kevaka dou se bera ni vakalivaliva, modou yalovata na iliuliu ena nomudou cabe ina veitabana ni matanitu. Dou yalovosota, e sega ni ura me tei damu. Na ka bibi meda yalovata, ni yalovata ga e rawata.</li> <li>• Meda veiorogorogoci qai yalorawarawa ena noda veivosaki vakalewenikoro, nida vinakata kece me torocake noda koro. Dua mada, nida vinakata meda vakasola, ena gadrevi kina na qele. Kevaka eda duavata qai soli na qele qo, ena rawa na sasaga. E levu na koro era sa vakabula ika lelevu baleta na veisei.</li> <li>• <b>Cava tale o bau nanuma ena rawarawa kina me dua na sola ni koro, se me vakabalavutaki kina na bula ni sola sa tu rawa?</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                  |
| 2. Na <b>A</b> e ka lailai sara (5kW), ka levu na B (50kW). Ia rau qarava ruarua e 50 na vale. Kena ibalebale ena sola A e rawa ga ni vakayagataki na iyaya lalai, de qai usabi na sola lailai qai mate. Ia ena B, e rawa ni vakayagataki na iyaya lelevu, sega ni kasura na sola. | <ul style="list-style-type: none"> <li>• Meda kila na lewenikoro mai na itekivu ni yalani na livaliva e solia na lawa lailai sola meda vakayagataka kece. Koya gona, nida kila ni yalani, meda maninitaka vakavuku na livaliva.</li> <li>• Na gumatua ni sola e vereverea kena fikataki. E dodonu me rauta vinaka na gagadre ni vale kece, ia e dredre meda kila rawa qori, ni se bera vakadua ni vakalivaliva na koro. Vinaka meda dikeva na gagadre ni vale yadudua, qai fikataka se vica taucoko ena gadrevi. Ke mani lailai na kena isoqoni, eda na digitaka na sola lailai saurawarawa. Ena rawarawa na volia, qai bau vakalivaliva kina na koro, kena seva ga ni na vakaiyalayala ga na livaliva ni vale yadua. Kevaka e mani levu na isoqoni ni livaliva gadrevi, eda na via volia na sola levu qai saulevu sara, e na qai dredre na kunea na kena ikolo, se sega sara ni rawa, da qai tini ena tagi ni sega tu noda sola.</li> <li>• Sa macala gona ni lewalewai dredre na ka qo. Me kua ni lailai sara, kua ni levu sivia. Veitalia se sola cava eda volia, sa na noda itavi kece na maninitaki livaliva. Na lailai ni noda vakayagataki livaliva, na lailai ni kena isau, na balavu talega ni kena cici tiko na sola. Nanuma talega ni sola usabi ena kasura totolo, koya e lailai na kena iusana ena cici balavu.</li> <li>• <b>Cava tale era nanuma na lewenikoro me bula kina na livaliva, bula kina na ilavo, qai dede kina na bula ni sola?</b></li> </ul> |

|                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| <p>3. Na livaliva ena <b>A</b> e saulevu sara <b>(\$2.00/uniti)</b> saulailai sara na <b>B (\$0.50/uniti)</b>. Cava na vu ni duidui, cava e sega ni rawa ni tautauvata kina?</p>                                                                      | <ul style="list-style-type: none"> <li>• E dodonu beka me tautauvata na isau ni livaliva vei keda kece. Kena leqa ga ni yavutaki na kena isau ena rai vakabisinisi, ni vakatautaki ena levu na tikina vereverea me vaka na isau ni kena vakadurī, isau ni kena qaravi, ivodovodo, kena vakailavotaki (cau, dinau &amp;s). Kena ibalebale nira duidui kece na sola, qai duidui na kedra cicivaki.</li> <li>• Kaya mada, ke vakailavotaki na sasaga ena cau, ena sega ni saumi lesu na isau ni kena vakadurī, mani lailai kina na isau ni livaliva. Ia, ke mani voli ena ilavo dinautaki (da kaya me \$2 milioni na dinau mai na baqe), sa na vinakati me boko na dinau ena ilavo rawa mai na isau ni livaliva. Qo e dau kena itinitni ni saulevu na livaliva, me boko kina na dinau ena gauna yalataki.</li> <li>• E dau vakalevu mera bose rawa vakoro qai sevu na sasaga, qai veivosakitaki rawa na isau ni livaliva se ra na sauma rawa se sega. Dodonu meda vakadeitaka vakoro ni sega tale na ka me saumi, vica na isau ni livaliva, vica na kena dede ni o na vakayagataka na iyaya cava. Vinaka mo yavutaka nomu vakanuinui ena itukutuku dina, kua na vatavatairalago o qai kurabui e muri. E dau kena ivakarau ni na mate vinaka na isau ni livaliva nio maninitaki livaliva qai vakayagataka na iyaya mamaqi.</li> <li>• <b>Cava tale meda cakava na lewenikoro me rawa kina na ilavo ni sasaga, meda kua kina ni vakararavi mai muri?</b></li> </ul>                                                                                                                                                     |
| <p>4. Rau rawa tubu ruarua na sola, kena ibalebale ni levu na ilavo e rawa kina, lailai e vakayagataki. Cava meda vaqara tubu kina? Vakacava me lutu na isau ni livaliva me rawa ga kina na ilavo me saumi kina na kena cicivaki, me kua na tubu?</p> | <ul style="list-style-type: none"> <li>• E ka bibi sara me rawa ilavo na sola, sega ni baleta ga na kena cicivaki, me tu vakarau ga de tubu na leqa qai saulevu na kena vakavinakataki. Rawa ni ca na ivuki (Inverter) se vakacacani na ulunisola ena cagilaba. Kevaka madaga e sega ni ca se vakacacani, ena qase mai na kena gacagaca kece qai vinakati me sosomitaki.</li> <li>• Da kaya mada, sa oti e yabaki 5 qai na na beaeri ni <b>A</b>, ia na isau ni bateri vou e \$50,000. Na <b>A</b> sa rawata tiko e \$7,200/yabaki, kena ibalebale ena 5 na yabaki sa vakabula kina e <math>\\$7,200 \times 5 = \\$36,000</math>. Qo e sega ni rauta me voli na bateri, e vinakati tale e \$14,000. <b>Kau mai vei na ilavo qo?</b> Ke sega ni kune totolo na ilavo qo, sa na mate vakadua na sola ni mate vata na bateri, qai sega tu noda liivaliva. E vaka kina na ivuki (inverter) vou e rawa ni kena isau e \$15,000, Na ulunisola e rawa ni ya \$300 &amp;s Kua ni nuitaka na matanitu se liganicau, de na lala nodra taga. E ka bibi gona me rawati koya na sasaga, me tu vakarau na ilavo ni isasabai me voli kina na gacagaca se saumi na ripea, me cici tikoga na sola me vakalivaliva tikoga kina noda vale kece. Na sasaga kece me rawa tubu me tiko na isasabai.</li> <li>• Nanuma tiko, na sola lailai e lailai na livaliva e solia, ia era lalai na kena gacagaca qai saulilai na volia se vakavinaktaka.</li> <li>• <b>Cava tale o bau nanuma meda kua ni vakararavi kina na lewenikoro ena noda qarava vakavuku na sola, meda kua kina ni vaqara veivuke mai tuba ni kune na leqa?</b></li> </ul> |



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| <p>5. Leqa cava tale eda dau donuya ena sasaga tale eso e rawa ni ka ni vuli vei keda, cava e rawa nida cakava me kune kina na kena iwali?</p> | <ul style="list-style-type: none"> <li>• E so na yavusa se mataqali era dau veiletitaka na qele, se beitaki itaukei ni sola se kena komiti ni sivia na isau ni livaliva, se butakoci na isau ni livaliva, lawaki ca &amp;s, koya e tini kece ena lusi ni lewe ni yavusa se mataqali kece. Me vaka sa dusimaki oti, e ka bibi sara meda rogoca na domo kece, veivosaki tikoga kei ira kece na kauwai kina, qai saga meda veivosaki tikoga ena yalodina.</li> <li>• E dau yaco wasoma me beitaki cala na komiti ni livaliva ena ka e sega ni nodra yalava. E vinaka me dau vakaivolataka na komiti na veika vakailavo, qai tukutuku wasoma vei ira na lewenikoro, me sereki kina na veika vakailavo kei na ka bibi tale eso.</li> <li>• E so era dau via sagā na mita, se butako livaliva. Qo e lailai kina na noda ilavo e rawa qai rawa ni vakatubu leqa. E so madaga na sola sa sogo vakadua kina, ni sa sega ni dua e sauma tiko baleta ni le vica ga ra lawaki ca tiko. E ka bibi meda kila kece ni ivurevure duadua ga ni ilavo na isau ni livaliva, ke sega sa na sega ni rawa ni qaravi na sola se vakavoutaki se vakavinakataki.</li> <li>• E vakaiyalayala na kila vakenadau vei ira na lewenikoro me cicivaki tikoga kina na sola, koya e dau vakatubu leqa se lekaleka kina na bula ni sola. E so na gauna e le dua ga na kena liga ena koro qai biuta na koro, sega na kena isosomi. E saulevu na kauti ira mai na kenadau mera mai veivuke. Ka ga meda cakava, meda raiyawa ena noda vaqara veivuke mera lesi e levu na lewenikoro mera lai vuli, se toroya cake nodra vuli, ena cicivaki sola kei na kena maroroi. E levu na sasaga e okati kina na veituberi vei ira na lewenikoro. Mera bose na lewenikoro me veilesi, me kua ni tagane uabula ga, me so na itabagone kei na yalewa. E bau dau le levu na tagane era biuta na koro mera vaqara cakacaka mai na taoni, qai vo ga o ira na yalewa. Ni ra tuberi talega na marama kei na itabagone, eda kila kina nira na kauwaitaka na sola ka qarava ena veitabagauna mai muri.</li> <li>• <b>O bau kila e so tale na sasaga e sotakaya na leqa? Cava beka na iwali ni leqa qori o nanuma tiko?</b></li> </ul> |
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5

Kere ilavo

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Na tabana ni matanitu se isoqosoqo liganicau era dau vinakata vakalevu meda sota ena bese se veivolavolai vakarautaki vakamaqosa ena vakarokoroko, mera qai vakadonuya mera cau vakailavo. E ka bibi na veivosaki. E rua na sala mo tarai ira kina na liganicau.

## 5.1 Veitalanoa

Na veitalanoa e kena ibalebale na veivosaki kei na tabana ni matanitu se isoqosoqo. E veivosaki lutubi, ke sega era nanuma tiko beka nida veivali. Dodonu talega mo sa vakadidike rawa baleta na sasaga, me tu vakarau na kena ivola me matata kina nomu vakamacala. Qori ena kila kina o liganicau nio kila vinaka na ka o tukuna tiko.

## 5.2 Veivolavolai

Na veivolavolai na sala e dau muri vakalevu ena noda kerekere vei ira na liganicau, vakabibi nira tu yawa. E rua na mataqali ivola era dau vinakata mera wilika na liganicau me soli kina na cau: na vakatutu matailalai ni sasaga (project proposal) se ivakamacala raraba (project concept note).

## 5.3 Vola vakatutu

O ira na liganicau e dau tu na ivolasui me vakaleweni ena kere veivuke ni sasaga ni ivurevure tudei. Koya qo me kua ni vakayagataki – me vakayagataki ga na kena e solia mai na liganicau.

**Yaca ni Sasaga:** Vola e ke na yaca ni sasaga – mv: Solar Power for Viwa Village

**Liuliu ni Sasaga:** Yacai koya e liutaka se kena komiti – mv turaganikoro

**iLavo kerei:** ilavo e vinakati baleta na sasaga – mv \$13,000 USD

**Dede ni sasaga:** vica na kena dede – mv: 8 vula

**Vakalekaleka:** Vakamacalataka vakalekaleka na sasaga. Me rauta ni 300 na vosa, me volai kina na leqa cava o via walia, na iwali ni leqa, kei na kena yaga vei ira na lewenikoro.

**Tukutuku ni Leqa:** Tukuna vakamatailalai na leqa o via walia

**iNaki levu ni Sasaga:** Tukuna na inaki levu ni sasaga mv: me vakacina na lomanikoro mera vuli leseni kina na gone.

**iNaki matailalai ni Sasaga:** Tukuna vakamatailalai na ka o via cakava. Qo me rawa ni vakarautaki mv: Vakaduri sola 2000 W – o sa tukuna vakamatata kina na gumatua ni ulunisola.

**Yaga ni Sasaga:** Tukuna na itinitini ni sasaga kei ira ena yaga vei ira.

**iTuvatuva ni Cakacaka:** Vakamatailalaitaka na cakacaka ena caka kei na gauna ena oti kina – dau vakalevu me tuvai vakateveli.

**Liganicakacaka:** Vakamacalataka na mataveivoli se koro se matatimi me cicivaka na sasaga. Sereka nodra dui taledi.

**Tuvailavo:** Vola rawa na ilavo kece ena vakayagataki ena sasaga. De dua o na lai taroga na isau ni so na ka. Vola kece na ka me na saumi kei na kena isau o nanuma tiko.

Qori e dua na sabolo ni vakatutu ni sasaga mo wilika me matata vei iko o qai tovolea mo vola nomu vakatutu.

**Yaca ni Sasaga:** Solar Power for Rock Island

**Liuliu ni Sasaga:** John Keri

**iLavo Kerei:** \$15,600

**Dede ni sasaga:** 12 vula

**Vakalekaleka:** O Rock Island e sega tiko ni vakalivaliva tudei. Kena ibalebale ni lekaleka na gauna ni vuli leseni ena bogi vei ira na gone, qai sega ni rawa na rogoca na irogo ena retio se tv ena siga. Neitou mataveivoli na Rock Island Cooperative sa mani lewa me dua na sola me vakalivaliva tuga kina o Rock Island. Keitou via muduka talega na vakacacani ni veikabula ena kubou kei na kosakosa ni idini ni livaliva. Keitou vinakata me qaravi ena sola na vale kece e 30 e Rock Island, wili kina na cina kei na TV. Sa maroroya rawa na Mataveivoli e \$4925 baleta na sasaga qo, sa mani kerei tale e \$15,600 me kena ivakacava.

**Tukutuku ni Leqa:** Na livaliva e Rock Island e vagauna ga. Na idini ni livaliva ni matanitu e dau yavala ena tolu na aua dua na siga, 6pm me yacova na 9pm. E dau vakosakosa ka vakuvukuvu. E sega ni rawa vei ira na gonevuli mera vakaotia nodra vuli leseni. Segi ni rawa na vakarogo irogo ena retio se sarava ena TV ena siga. Sa mai vakarerevaki sara talega na vakacina karasini ena bogi. Sa mai saulevu talega na isau ni waiwai kei na qaravi ni idini ni livaliva, sa tubu tiko e veiyabaki. E so na gauna e dau bera mai na waiwai ni kau mai tailevu.

**iNaki levu ni sasaga:** Me vakalivalivataki o Rock Island ena sala e sega ni vakacacani kina na veikabula.

**iNaki matailalai ni Sasaga:**

Volia e 30 na sola ya 50W kei na ya 3 na cina.

Vakaduria na sola ya 50W ena vale kece (30), me dua na kena dau.

Tuberi e so na lewenikoro ena qaravi sola.

**Yaga ni sasaga:**

Na kena yaga ni na vakalivaliva ni sola na vale kece e Rock Island e rawa ni vakayagataki ena bogi taucoko qai sega ni vakatubu nuiqawaqawa. Ena yaga vei ira na gone nira na rawa ni wiliwili vakavinaka ena bogi. Na lewenikoro e rawa ni rogoca na irogo bibi, qai jajataki talevoni mera veivosaki kina kei ira mai Tailevu.

**iTuvatuva ni Cakacaka:**

| Tasks to do                                                 | Months |     |     |     |     |     |     |     |     |     |     |     |
|-------------------------------------------------------------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                                                             | Jan    | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Determine how much power is needed in one home              |        |     |     |     |     |     |     |     |     |     |     |     |
| Size the solar power system                                 |        |     |     |     |     |     |     |     |     |     |     |     |
| Make a list of components needed for the project            |        |     |     |     |     |     |     |     |     |     |     |     |
| Ask local companies for quotations                          |        |     |     |     |     |     |     |     |     |     |     |     |
| Cooperative discusses and finalizes company to buy from     |        |     |     |     |     |     |     |     |     |     |     |     |
| Pay the company and ask them to visit the village           |        |     |     |     |     |     |     |     |     |     |     |     |
| Company technicians arrive and put dc lights in all houses  |        |     |     |     |     |     |     |     |     |     |     |     |
| Technicians mount the solar panel and othe things on houses |        |     |     |     |     |     |     |     |     |     |     |     |
| Commissioning of solar power systems and ceremony           |        |     |     |     |     |     |     |     |     |     |     |     |

(Qo e dua na kena teveli vakayagataki wasoma – vola na itavi me qaravi qai tawana na vula me caka kina – se rawa ni caka vakamacawa se vakasiga)

**Liganicakacaka:** Na Rock Island Cooperative e dau qarava na idini ni livaliva ena yanuyanu me bau vakacina ena bogi na vale kece. Era lewe ni mataveivoli na iliuliu ni vale kece. O Mr John Keri na iliuliu ni mataveivoli. Eratou le 10 na lewe ni mataveivoli eratou se qai vuli oti ena Sola ena Koro.

Tuvailavo:

| Item                   | Cost per item \$ | Quantity | Total cost \$ |
|------------------------|------------------|----------|---------------|
| 50W Solar PV Panel     | 150/item         | 30       | 4500          |
| Charge controller 20A  | 90/item          | 30       | 2700          |
| Battery 30Ah           | 300 each         | 30       | 9000          |
| DC light bulb kit of 3 | 20 each          | 30       | 600           |
| double core 10A wire   | 1.89 / meter     | 500      | 945           |
| Boat hire cost         | 200 / trip       | 4        | 800           |
| Technician cost        | 80/day           | 20       | 1600          |
| Food and catering cost | 300/day          | 1        | 300           |
| Travelling cost        | 20/trip          | 4        | 80            |
|                        |                  |          |               |
| Total cost             |                  |          | \$20,525      |

Volavola:

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## IVAKADRE 5

Vakasamataka e dua na sasaga ni ivurevure tudei me caka ena nomu koro, qai tu na kena yaga vei ira na lewenikoro. Veitalia se cava, sola se haidro se vuli vakabula livaliva. Oti, o na vakailavotaka vakacava na sasaga ya? Wilika tale na yacadra na liganicau ena leseni qo, digitaka e dua qai vola vakacaca na vakatutu ni sasaga qori. Qo e rawa ni caka vakaiwasewase. Kevaka e sega nio vola na vakatutu – vola madaga kena ulutaga me qaravi ena dui wase ni vakatutu. Tukuna vei ira na lewe ni kalasi dou qai veivosakitaka.

Kena isau: Ena duidui na kena isau, ia me sagai me saumi na tikina kece ena 5.3 e cake. Ena sega beka ni kilai kece kena matailalai, ia me tukuni ga vakacaca, me vaka na kena isau &s.

Me tukuni vei ira na lewe ni kalasi mera vakalewena na teveli e nodra ivolanivuli. Na sabolo e cake e rawa ni idusidusi ni iVakadre qo.

Yaca ni Sasaga:

iLiuliu ni Sasaga:

iLavo kerei:

Dede ni sasaga:

Vakalekaleka:

iTukutuku ni Leqa:

iNaki levu ni Sasaga:

iNaki matailalai ni Sasaga:

Yaga ni Sasaga:

iTuvatuva ni Cakacaka:

Liganicakacaka:

Tuvailavo:





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