Factors influencing solar water pump adoption by smallholders in Kenya | February 2017
USAID-KAVES – Who we are and what we do

• Kenya Agriculture Value Chain Enterprises project 2013-17
• USAID’s flagship Feed the Future agricultural development activity
• Goal of increasing productivity, incomes and nutrition of smallholder farmers
• Reducing poverty through value chain interventions
• Focus on maize, sorghum, dairy and selected horticultural crops
• 22 counties – offices in Nairobi, Kisumu, Eldoret and Kitui
• 500,000 small-scale farmers and increasing every day
Our theory of change

Smallholders will increase whole farm incomes and nutrition by raising productivity of maize from a reduced area of land and investing in higher value enterprises, particularly horticultural crops and dairy.
Relevant background facts about smallholders

- Average area per Kenyan farmer is 1.6 hectares
- Less than 5% of farmers have permanent water
- Small-scale farming will continue to dominate agriculture
- Smallholders need to produce high value crops and products to meet income expectations
- Small-scale farming is not less efficient than large-scale
- Smallholder aggregation systems are inefficient
- Cost and scarcity of labor is a major factor in reducing productivity
Key facts about the Kenyan smallholder market

- More than 5 million smallholder customers in Kenya and 20 million in East Africa
- Have money for inputs and technologies that work
- They are interested primarily in cash income so the technology must be focused on specific markets
- Since areas are small, high value crops and products are essential (dairy, horticulture)
- They need to see a quick impact in terms of cost saving or higher sales
- Depend on village level traders and suppliers
Cross-cutting actors affecting technology adoption

- Absolute cost - TC banana
- Functionality – solar irrigation pump
- Labor-saving potential – maize sheller
- Cost-effectiveness – Bio-pesticides
- Availability - fertilizer
- Reliability – HST bag
Key factors for population level adoption

- Work, either instantaneously or within a few days
- Low cost or at least perceived as affordable
- Increase access to a specific market, preferable for a high value crop/product
- Reduce labor costs
- Have a short learning curve
- Be locally available for purchase or rent
- Increase yield, sales or price
- Be cost-effective
- Low maintenance/running costs
- Add value to a standing or mature crop
Factors affecting solar pump adoption

Positive
+ High functionality
+ Labor-saving
+ Low running cost
+ High ROI (c.w. rainfed)

Negative
- High capital cost
- Limited capacity
- Limited availability and choice
Marginal Increase in Gross Profit (KES)

- Rain fed farmer
- Convert ½ acre from maize to high value crops
- Plants 3 crop cycles per year
- SWP used on other crops offset ½ acre of maize forgone.

Marginal increase one year*

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Gross Profit</td>
<td>132,775</td>
<td>100%</td>
</tr>
<tr>
<td>Cost of Pump</td>
<td>-65,000</td>
<td>49%</td>
</tr>
<tr>
<td>Net to farmer</td>
<td>67,775</td>
<td>51%</td>
</tr>
</tbody>
</table>

*Assumes sufficient conditions for solar pump irrigation

Legend:
- Cabbage
- Potatoes
- Carrot
- Onions
Results and Conclusions so far:

- 232 KAVES farmers using SWPs
- ROI positive for farmers converting from rainfed production
- Latest Sunflower SWP can run 4 sprinklers per SWP
- Use of sprinkles reduces soil erosion
- Near zero break-down of SWPs installed in 2014-16
- Interest and demand high, commercialization taking place
- Market for at least 200,000 pumps
- Irrigation policies need revising to support SHFs