Morgan Stanley Sustainable Investing Challenge 2014

HELIOS
Financing solar irrigation in India
CHALLENGE: 70 million farmers in India power their irrigation systems with diesel generators

- High fuel costs
- Exposure to fuel price volatility
- Wasteful fuel subsidies
- CO₂ emissions
OPPORTUNITY: Solar-powered irrigation systems alleviate all these issues, are now economical

Total cost of ownership of irrigation systems

'000 INR

- Diesel
- Diesel w/out subsidies
- Solar

-80%

Proven technology
No fuel or subsidy costs
Lower maintenance costs
No CO₂ emissions

1 Based on HWWI and HELIOS research, current fuel prices based on EIU research, lifetime 20 years, discount rate 10%
BARRIERS: Adoption of solar-powered irrigation hinges on available financing and improvements in distribution

1. Financing: The underserved "middle market segment"
   - Typical loan for solar-powered system ~3400 USD, 5-6 years
     - Too large, tenure too long for typical micro financing
     - Too small, with little-understood collateral for commercial banks
   - Total capital need enormous: Replacing all pumps would require > USD 100bn

2. Distribution: Little coordination along supply chain
   - Distributors sell only small volumes, have no access to volume rebates
   - Lack of standardization means higher maintenance costs, weak secondary markets
HELIOS solves this challenge by bringing institutional investors, system providers and farmers together.

**Institutional investors**
Provide capital

**Microfinance institutions**
Originate & collect loans
- Arman
- SEWA Bank
- SEIL

**Irrigation providers**
Sell & maintain irrigation systems
- Jain Irrigation Systems Ltd.
- SELCO
- KSR

**Farmers**
Use irrigation system
# HELIOS reduces annual costs for farmers and eliminates risks of fuel price and subsidies

<table>
<thead>
<tr>
<th></th>
<th>Diesel system</th>
<th>Solar with HELIOS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structure</strong></td>
<td>Either already owned (convert) or newly acquired</td>
<td>Loan over 3400 USD, 5 years repayment, 16% real interest</td>
</tr>
<tr>
<td><strong>Up-front costs</strong></td>
<td>~ 550 USD</td>
<td>1000 USD (down payment)</td>
</tr>
<tr>
<td><strong>Annual costs</strong></td>
<td>~1000 USD</td>
<td>First 5 years: ~720 USD Then: ~20 USD</td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td>Often required, accounts for up to 5% of annual costs</td>
<td>Provided by HELIOS, then ~20 USD/year</td>
</tr>
<tr>
<td><strong>Price risks</strong></td>
<td>Fuel price (last 5yrs: +50%) Reductions in fuel subsidies</td>
<td>-</td>
</tr>
</tbody>
</table>

Conversion from diesel\(^1\): NPV USD 2670, IRR 45%

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\(^1\) Lifetime of 10 years, discount rate 10%

SOURCE: HELIOS, Microfinance Information Exchange, Price quotes from diesel and solar producers
HELIOS is an open-ended structured fund that will reinvest principal repayments and disburse interest.

**Financing Structure**
- Open-ended fund
- Target size: $10m
- Capital called in tranches (multiples of $1m) to account for scaling
- Principal reinvested, interest disbursed

**Sources**
- Newly raised capital
- Farmer payments
  - Principal
  - Interest

**Uses**
- New installations
- Fund management fee
- Interest to investors
- Performance bonus
HELIOS will return 7% annual interest + 80% of the upside to investors and allow for an exit after 10 years.

### Profit-sharing arrangement

- 2% management fee
- 7% hurdle rate
- Returns above 7% will be split 80:20 in favor of investors

### Exit option

- When investor wants to exit, principal will be repaid over following 5 years

### Sample calculations for annual profit sharing

<table>
<thead>
<tr>
<th></th>
<th>Low case</th>
<th>Base case</th>
<th>High case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achieved return(^2)</td>
<td>7.0%</td>
<td>12.3%</td>
<td>15.0%</td>
</tr>
<tr>
<td>Retained by HELIOS</td>
<td>0.0%</td>
<td>1.1%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Returned to investors</td>
<td>7.0%</td>
<td>11.2%</td>
<td>13.4%</td>
</tr>
</tbody>
</table>

1 Assuming gradual scale-up, exit of investors in years 11-15
2 After 2% management fee
HELIOS will create a 12-15% IRR for investors under 9 key risk scenarios

Risk mgmt of default rates:
- Alignment of incentives with MFIs
- Resale/reuse strategy for collateral (solar panels)
- Potential insurance against extreme weather events

Risk mgmt of delays in deployment:
- Tranching of capital injections
- Strategic partnerships with experienced distributors
- Alignment of incentives (signup bonus)

Sensitivity calculations: IRR

<table>
<thead>
<tr>
<th>Deployment speed</th>
<th>Default rate</th>
<th>Low</th>
<th>Base</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast</td>
<td>Low</td>
<td>14.2%</td>
<td>13.8%</td>
<td>13.3%</td>
</tr>
<tr>
<td></td>
<td>Base</td>
<td>14.2%</td>
<td>13.8%</td>
<td>13.3%</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>13.0%</td>
<td>12.6%</td>
<td>12.3%</td>
</tr>
</tbody>
</table>
HELIOS will deliver significant social impact for the farmers and society at large

For the farmer

• Lower fuel costs of **USD 800 / year**
• **No exposure** to oil price volatility
• **No dependency** on fuel subsidies

For society at large

• No local **air pollution**
• Fuel subsidies saved: **USD 18.6 million**
• Lower **CO₂ emissions**: **350,000 t CO₂**

1 Based on full deployment with USD 10m assuming a ten year project lifetime
HELIOS has sparked interest with investors and partners, is entering a pilot phase this summer.

**Idea phase**
Jul 2014
- Test and refine idea with experts
- Elicit interest with and select partners for pilot phase:
  - Local distributor
  - Fin. service provider
- Define pilot team
- Raise funding for pilot phase

**Pilot phase**
Aug 2014 – Aug 2015
- Define specific pilot region (most likely in South Gujarat)
- Assess and select equipment
- Install at least 50 systems
- Refine processes
- Raise funding for scaling phase

**Scaling phase**
Sept 2015
- Extend partnerships
- Call first tranche
- Scale up loan disbursement
- Foundations
- Potentially angel investors
- Potentially impact investors
- Institutional investors
- Impact investors
HELIOS has identified Gujarat as ideal state to start a pilot, with lots of potential to scale across India

Why start in Gujarat?

Favorable business climate
- No domestic content requirements
- 34 international companies are developing Gujarat’s large-scale solar

Strong agricultural and solar sector
- 34% growth in cropped agricultural land in last 10 yrs
- 320,000 hectares of land covered by micro irrigation
- Diversified crop & cropping patterns
- Rapid growth of economy and population (60m)

State support for solar
- National Solar Mission support for off-grid systems
- More than 1 GW of solar PPA's closed
- More than 823 MW built by 2013
HELIOS has tested and refined its model thanks to the input of numerous partners and mentors.

**Mentors and advice**

<table>
<thead>
<tr>
<th>Name</th>
<th>Role and Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atish Babu</td>
<td>Venture Capital, focused on agriculture and food tech startups in India; MBA HBS, MIT SB</td>
</tr>
<tr>
<td>Roger Leeds, PhD</td>
<td>Leading expert for emerging markets (WB, IFC) and VC fund manager</td>
</tr>
<tr>
<td>Mark Peterman, PhD</td>
<td>CEO, OndaVia</td>
</tr>
<tr>
<td>David Lingelbach, PhD</td>
<td>20+ years experience in banking, hedge fund mgmt in emerging economies</td>
</tr>
<tr>
<td>Kurt Lambert, PhD</td>
<td>Serial entrepreneur, developer of first hedge fund credit risk methodology</td>
</tr>
<tr>
<td>Tanvi Nagpal</td>
<td>15 yrs experience in development program management in the water sector, Gates Foundation, WB</td>
</tr>
<tr>
<td>Salman Zaheer</td>
<td>Former Energy Sector Manager, South Asia, The World Bank</td>
</tr>
<tr>
<td>Biplab Paul</td>
<td>Social Entrepreneur, Irrigation in Gujarat, Awarded by Ashoka, US Dept of State, WB, Aga Khan</td>
</tr>
<tr>
<td>Anita Campion</td>
<td>President AZMJ</td>
</tr>
<tr>
<td></td>
<td>20+ years experience in ag finance</td>
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</tbody>
</table>

**Potential partners**

<table>
<thead>
<tr>
<th>Name</th>
<th>Role and Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr. Jain</td>
<td>CEO Jain Solar</td>
</tr>
<tr>
<td>Mr. Girish NR</td>
<td>SELCOLABS</td>
</tr>
</tbody>
</table>

**Picture credits:** International Water Management Institute
Appendix
The HELIOS team has strong experience in finance, consulting, international development and resources

- **Mallory Baxter**
  - 3 years experience in public financial management (Gov’t of Canada)
  - Project mgmt. experience in social impact assessment
  - MA in Int. Economics, Int. Development¹

- **Nick Luter**
  - 7 years work experience conducting hedge fund risk analysis and research
  - Experience working on Int’l Development Consulting projects and with OPIC.
  - MA in Int. Relations and Economics¹

- **Markus Wilthaner**
  - 5 years work experience in strategy (McKinsey) and IT consulting
  - MA in Int. Economics, Energy & Resources¹
  - MSc Business Informatics, TU Vienna / NU Singapore

- **Michael Eschmann**
  - 3 years work experience in renewable energy consulting - expert for sustainability impact measurement
  - MA in Int. Economics, Energy & Resources¹
  - B.A. Business Administration and Finance, Zurich University

¹ Expected May 2014
HELIOS structure and cash flows

- **HELIOS Equity investors**
  - Equity investment

- **Investors**
  - Investment
    - Dividends

- **Equipment supplier**
  - Equipment costs

- **HELIOS Management company**
  - 2% Mgmt Fee
  - Share of upside

- **HELIOS-I Fund SPV**
  - Signup, performance bonus
  - Repayment
  - Financing partner
  - Repayment

- **Farmer**
HELIOS is able to manage risks better due to scale

<table>
<thead>
<tr>
<th>Key risk</th>
<th>Impact</th>
<th>Probability</th>
<th>Mitigation strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in fuel subsidies</td>
<td>Medium</td>
<td>Low</td>
<td>• Slow down deployment and capital calls</td>
</tr>
<tr>
<td>Increase in solar panel prices</td>
<td>Medium</td>
<td>Low</td>
<td>• Manage volume contracts with suppliers, slow down deployment and capital calls</td>
</tr>
<tr>
<td>Higher default rates due to extreme weather event, adverse food prices…</td>
<td>High</td>
<td>Medium</td>
<td>• Improved monetization of collateral due to scale and arrangements with producers</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>Medium</td>
<td>• Aligning interests of distributors and finance providers through bonus payments</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Insurance against adverse weather events or food prices</td>
</tr>
<tr>
<td>Depreciation of rupee against USD</td>
<td>Medium</td>
<td>Medium</td>
<td>• Tranching allows for some flexibility in disbursement</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Potentially financial hedging (dependent on investor preferences)</td>
</tr>
</tbody>
</table>
Key assumptions in financial model

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Value</th>
<th>Source</th>
</tr>
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<tbody>
<tr>
<td>Loan to Farmer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest Rate (Real)</td>
<td>16 %</td>
<td>MFI interviews</td>
</tr>
<tr>
<td>Loan Size</td>
<td>$ 2363</td>
<td>Calculated</td>
</tr>
<tr>
<td>Default Rate</td>
<td>8%</td>
<td>Assumption – 2% in Y1-3, 1% in Y4-5</td>
</tr>
<tr>
<td>Down Payment</td>
<td>30%</td>
<td>Industry standard</td>
</tr>
<tr>
<td>Repayment Period</td>
<td>5 years</td>
<td>MFI interviews</td>
</tr>
<tr>
<td>Solar System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capex</td>
<td>1588 $/KW</td>
<td>Research with equipment suppliers</td>
</tr>
<tr>
<td>Volume rebates</td>
<td>15%</td>
<td>Research with equipment suppliers</td>
</tr>
<tr>
<td>Average fuel costs (for diesel equivalent)</td>
<td>1.32 $/l</td>
<td>0.8 $/l (Delhi price) + 65% (GSMA)</td>
</tr>
<tr>
<td>Financing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative fee</td>
<td>$ 5/loan and year</td>
<td>MFI interviews</td>
</tr>
<tr>
<td>Distributor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signup bonus</td>
<td>$ 50</td>
<td>MFI interviews</td>
</tr>
</tbody>
</table>
Examples of solar-powered water pumps

- **Producer:** Eco Systems International
  - 2.5 hp (~1.9 kW)

- **Producer:** CLARO
  - 7.5 hp (~5.6 kW)