Solar Magnetic Plunger Pump
SMPP
A game changer in rural water supply

April 2020
Who we are

**Comet-ME** - NGO with 10 years of hands-on in developing renewable-energy and clean water-provision projects for off-grid communities, providing services to ~10,000 Palestinians

SMPP: motivated by similar principles, a team of Israeli & round-the-globe hi-tech veterans developed the SMPP, addressing the most acute global water provision need: off-grid smallholder farmers in arid regions with no access to surface water

A for-profit company will be established in 2020 for Productization, Sales and Growth
The Team

ELAD ORIAN
GM
A decade of field experience. MA in Physics & MA in Environmental Science, Policy & Management

NOAM DOTAN
Technical & Project Manager
30 Years at the forefront of the Israeli hi-tech industry. MA in Physics

RYAN BRAND
Mechanical Eng.
Track record in both the solar industry and the car racing industry. MA in Mechatronics

JUSTUS HOFFSTAEDT
Electro-Mechanical Eng.
MA in Mechatronics. Expertise in Solar Energy

GAL LIOR
Electronics Eng.
Expert in motion control

AVI SIMON
Business Development
P&L units, CMO, R&D @ Applied Materials, HP, ElOp
Solar Pumps Landscape

Type of Classifications:

- by source: surface/submersible
- by application: irrigation/drinking
- irrigation: flood, drip, sprinkles
- by user: mid/big farms, smallholder farmers, villages, hospitals
- by flow & by head
- expensive, high-end & low cost & quality
- big Brands and diverse cheap suppliers

Smallholder farmers:

- the biggest homogeneous market - by far
- with the most acute water shortage
- w/well-defined irrigation needs: 20-30 m³/day
- head range up to ca 45m - due to high drilling cost

In spite of the diversity there is not a single solar pump in the market specifically tailored to smallholder farmers
The Need and the Problem

Access to Water

- Over 500 M off-grid smallholder farmers don’t use irrigation (ca $1.5 Trillion market)
- A major barrier to economic growth & food security

Solar Pumps is the best answer, however

What hinders Solar Pumps Adoption

- Slow ROI and lack of awareness that bring:
  - Farmers hesitation to take loans
  - Banks hesitation to land money

Fast ROI Drivers

- Pump’s low CoO and cost per m³ of water:
  - low price
  - high reliability
  - field maintenance

- daily flow rate
- high efficiency
- direct irrigation

No player in the market brings the message of accelerating the pace of Solar Pumps Adoption
Our solution: The SMPP

Reviews with all stakeholders in the field

From-scratch, clean-sheet design

SMPP - tailored in every respect for smallholder farmers (Patent allowance)

Best performance @ the lowest cost of Ownership = fastest ROI

Fast ROI ► accelerates adoption pace of solar pumps ► game-changer in rural water supply

A short video on the SMPP can be seen [here](https://example.com).
Innovative robust design

Traditional single action piston pump with cam shaft gear

The SMPP:
No Gear, No rod,
Fits 4” borehole

Double action piston pump

SMPP: Double action plunger pump driven by a linear electromagnetic motor

Millions of hand piston pumps in Africa and India. Piston/plunger pumps are more reliable and immune to sand & particles in the water.
SMPP Specifications

- Shallow aquifer pumping - head range of 10-45 m.
- Daily capacity of up to 30 cubic meters, sufficient for irrigating 1 hectare/providing water for a village.
- Diameter: 90 mm (fits in 4” borehole).
- Low solar power pumping capabilities.
- Monitoring includes flow data for PAYG, as well as I/Os for soil moisture and other sensors.
Impact – SDGs (based on excerpt from 2019 UKaid E4A)

The yield uplift and greater resilience from solar-powered irrigation make progress towards **SDG 1.5**: No poverty; and **SDG 2.1, 2.3, 2.4**: Zero hunger.

Solar water pumps provide households, schools, hospitals, with reliable sources of clean water, reducing water-borne diseases, supporting **SDG 6.1, 6.3, 6.4**: Availability and Management of water and sanitation.

The environmental benefits of solar pumps, compared to fuel pumps, contribute to furthering **SDG 7.1, 7.2, 7.3, 7b**: Affordable and renewable energy; and **SDG 13.1**: Climate Change and Impact.

Solar pumps reduce the time spent on collecting water, commonly undertaken by women ➤ progress towards **SDG 5.4**: Gender Equality.
SMPP competitive advantages

**Advantage by specs:**
Flow and head range tailored to smallholder farmers

**Advantage by Design Concept:**
- Slow-moving piston = immunity to sand, vs premature wear of high speed pumps
- Single moving part = Reliability + field serviceability = Longest life span
- Operates at lower solar conditions vs high RPM pumps = more water per day
- 1/2 market price + lowest CoO + lowest cost / m³ = affordable for < 2$ p.p.p farmers

**Tests Proven Advantages:**
- Sand concertation > 250 gr/m³ = X5 that of the leading players
- Performance as planned, best in market – see comparison tables

The same superior design is scalable to higher flow and heads, as well as adaptable to surface pumping.
# Competitive analysis (based on brochures)

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Model</th>
<th>Operating principle</th>
<th>End-user Cost ($)</th>
<th>Maint’ Cost ($/year)</th>
<th>Additional Cost per 15 years ($)</th>
<th>Notes:</th>
<th>Life Span Yrs</th>
<th>Rated power (W)</th>
<th>Flow rate at 30 m head - lpm</th>
<th>Sun hours</th>
<th>Capacity over 15 Yrs [cubic M]</th>
<th>Cost per cubic M over 15 Yrs</th>
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</thead>
<tbody>
<tr>
<td>Comet-ME</td>
<td>SMPP</td>
<td>Double action Plunger</td>
<td>$1,250</td>
<td>$0</td>
<td>$650</td>
<td>7.5 Yrs motor life (field replaceable)</td>
<td>7.5</td>
<td>500</td>
<td>45</td>
<td>7</td>
<td>103,478</td>
<td>$0.018</td>
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<tr>
<td>Grundfos #1 in Pumps</td>
<td>11 SQF-2</td>
<td>Helical</td>
<td>$2,200</td>
<td>$0</td>
<td>$2,200</td>
<td>7.5 Yrs life of Motor/pump</td>
<td>7.5</td>
<td>500</td>
<td>41.6</td>
<td>6</td>
<td>81,994</td>
<td>$0.054</td>
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<tr>
<td>Lorentz #1, Solar Pumps</td>
<td>PS200 HR-07</td>
<td>Helical</td>
<td>$2,170</td>
<td>$0</td>
<td>$2,170</td>
<td>7.5 Yrs life of Motor/pump</td>
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<td>250</td>
<td>40</td>
<td>6</td>
<td>78,840</td>
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<td>Sun Culture</td>
<td>Rain Maker 2S</td>
<td>Helical</td>
<td>$500</td>
<td>$0</td>
<td>$2,000</td>
<td>3 Yrs life of Motor/pump</td>
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<td>SunPumps</td>
<td>SCS 7-210-60</td>
<td>Centrifugal</td>
<td>$1,675</td>
<td>$0</td>
<td>$3,350</td>
<td>5 Yrs life of Motor/pump</td>
<td>5</td>
<td>500</td>
<td>28</td>
<td>6</td>
<td>55,188</td>
<td>$0.091</td>
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<tr>
<td>Aquatec</td>
<td>SWP-6000</td>
<td>Diaphragm</td>
<td>$695</td>
<td>$25</td>
<td>$3,725</td>
<td>5 Yrs motor, repl’ seals, valves, brush every 2 Yrs</td>
<td>5</td>
<td>150</td>
<td>13.2</td>
<td>6</td>
<td>26,017</td>
<td>$0.170</td>
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<td>Sun Rotor</td>
<td>SR-4</td>
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<td>$1,360</td>
<td>$0</td>
<td>$2,720</td>
<td>5 years life of Motor/pump</td>
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<td>390</td>
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<td>$2,345</td>
<td>5 Yrs motor, repl’ seals, brush in 2 Yrs</td>
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<td>125</td>
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<td>Fuel Pumps *</td>
<td></td>
<td></td>
<td>$500</td>
<td>$150</td>
<td>$14,250</td>
<td>3 years life time</td>
<td>3</td>
<td>45</td>
<td>2</td>
<td>2</td>
<td>29,565</td>
<td>$0.499</td>
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</table>

* The Flow rate of Fuel pumps is much higher, so they are used only for a few hours per day to fill up reservoirs (otherwise aquifers will be quickly drained)
There is no pump that matches the flow rate and efficiency of the SMPP at all pump head range.

### Table: Global LEAP – 2019 comparison

<table>
<thead>
<tr>
<th>Pump Brand, country, name</th>
<th>Test Head</th>
<th>Tested Solar power</th>
<th>Pump type</th>
<th>Price index no PV</th>
<th>Daily capacity cubic m</th>
<th>Hrs of Ops</th>
<th>Price Score</th>
<th>Figure of merit</th>
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</thead>
<tbody>
<tr>
<td><strong>Submersible pump - low head, low flow</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Bengal - India, 3DPC3.5-95-48-750</td>
<td>10</td>
<td>1000</td>
<td>Centrifugal</td>
<td>$$</td>
<td>31.4</td>
<td>11.1</td>
<td>2</td>
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<td>Azuri - UK, PS2-100 AHRP-235</td>
<td>10</td>
<td>200</td>
<td>Helical</td>
<td>$$</td>
<td>16.2</td>
<td>8.7</td>
<td>2</td>
<td>4.050</td>
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<tr>
<td>Lorentz - Germany, PS2-600 C-SJ8-5</td>
<td>12.5</td>
<td>410</td>
<td>Centrifugal</td>
<td>$$$</td>
<td>30.2</td>
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<td><strong>Submersible pump - medium head, low flow</strong></td>
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<tr>
<td>SunCulture - China, RainMaker2S</td>
<td>30</td>
<td>600</td>
<td>Helical</td>
<td>$</td>
<td>7.3</td>
<td>8</td>
<td>1</td>
<td>3.650</td>
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<tr>
<td>Lorentz - Germany, PS2-100AHRP-07S-2</td>
<td>30</td>
<td>205</td>
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<td>$$</td>
<td>7.3</td>
<td>9.7</td>
<td>2</td>
<td>5.341</td>
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<td>SolarTech - China</td>
<td>40</td>
<td>600</td>
<td>Helical</td>
<td>$$$</td>
<td>14.3</td>
<td>10.1</td>
<td>3</td>
<td>3.178</td>
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<td>SSG - India</td>
<td>40</td>
<td>600</td>
<td>Helical</td>
<td>$$$</td>
<td>14.3</td>
<td>9.2</td>
<td>4</td>
<td>2.383</td>
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<td>SMPP Comet-ME</td>
<td>20</td>
<td>400</td>
<td>SMPP</td>
<td>$$</td>
<td>26.4</td>
<td>8</td>
<td>2</td>
<td>6.600</td>
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<tr>
<td>SMPP Comet-ME</td>
<td>20</td>
<td>500</td>
<td>SMPP</td>
<td>$$</td>
<td>31.2</td>
<td>8</td>
<td>2</td>
<td>6.240</td>
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<tr>
<td>SMPP Comet-ME</td>
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<td>600</td>
<td>SMPP</td>
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<td>8</td>
<td>2</td>
<td>6.950</td>
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<td>SMPP Comet-ME</td>
<td>40</td>
<td>600</td>
<td>SMPP</td>
<td>$$</td>
<td>20.6</td>
<td>8</td>
<td>2</td>
<td>6.867</td>
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</tbody>
</table>

**Figure of Merit = = Head* daily capacity/Power*10 (SMPP = X 2-3 better than all other pumps in head-flow range)**

Note that the daily capacity by itself has a direct effect on the ROI.

There is no pump that matches the flow rate and efficiency of the SMPP at all pump head range.
Status

Business

- **LOI from JDC**: to lead the 1st Pilot in Ethiopia, following visit invited by Tikun Olam V.
- Additional **MOUs for Pilots**: • Arieli – Ghana • FuturePump – UK pump supplier
- **Visited in Kenya**: • Davis & Shirtliff – big distr. • and many holistic agri-businesses
- **Demo Center**: planned at Netafim, the WW leading irrigation company

Technical

- Eng’ models **tested** for 18 mo’, performs to Spec
- Check valve **tested** by experts (Infinity, Canada)
- Life cycle **tests** of piston seals and bearings are continuously performed, with excellent results

Funding

- For last 4 years by Osprey Foundation and Comet-ME
- Israeli Innovation Authority - final approval stage + $-match by Comet
Go To Market

Pilots in Africa
- Run Pilots prior to sales in every region for presence and PR
- Start in Ethiopia with JDC’s support following thorough Alpha tests

1. Fuel Pumps Replacement
   “Low-hanging”: awareness is there
   - investment is lower
   - financial benefits are clear
   - start w/distributors in the Pilot region

2. Fan-out
   Position the SMPP as the best choice for replacing fuel pumps
   - Widen our presence throughout Africa

3. Smallholder Farmers in Africa
   Tap into the largest market and grow
   - start via agribusiness providing all needs - from awareness & training to inputs & financing

4. Go Global
   Large scale distribution, addressing additional applications and supplying systems – not only components
Market Sizing

Global Smallholders
Total Available Market:

500,000,000 units
$ 1.5 Trillion

E4A 2030
Addressable Market:

4,900,000 units
$15.6 Billion

2019 Market:
168,000 units
$500 Million

SMPP Addressable Market

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-Units</td>
<td>$ M</td>
<td>$ M</td>
</tr>
<tr>
<td>0.04</td>
<td>125</td>
<td>4,900</td>
</tr>
<tr>
<td>10</td>
<td>10,000</td>
<td>TBD</td>
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</table>

+ Fuel Pumps Replacement
Milestones

1st Pilot Agreement

2020 Q2
Start 1st Pilot in Butajira

2020 Q4
Low-Cost Transition

2021 Q1
Demo Centers Up

2021 Q3
Start Sales

2021 Q4
Start developing new models

2022 Q1
Go Global

2022 Q3
Financial Projections

Revenue
(unit sale = $1K)

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>2022</td>
<td>$100,000</td>
</tr>
<tr>
<td>2023</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>2024</td>
<td>$7,000,000</td>
</tr>
<tr>
<td>2025</td>
<td>$25,000,000</td>
</tr>
<tr>
<td>+Indian Market</td>
<td>$45,000,000</td>
</tr>
<tr>
<td>+High Head Pump</td>
<td>$50,000,000</td>
</tr>
</tbody>
</table>

Funding needs (assuming IIA R&D grants):

a. For R&D and pre-market activity: $1.5M-2.5 by Q3 2020
b. For Market penetration: $3.5-4.5M by Q1 2021
c. For sales infrastructure, break even and growth: $5.0-6.5M by Q1-2022
## Use of Proceeds of $1.5M

<table>
<thead>
<tr>
<th>Expense Activity</th>
<th>USD</th>
<th>Expense Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integration (Pump, control, monitoring, PAYG)</td>
<td>500,000</td>
<td>800,000</td>
</tr>
<tr>
<td>Low cost technology transition and tests</td>
<td>300,000</td>
<td>250,000</td>
</tr>
<tr>
<td>Pilots in Africa</td>
<td>700,000</td>
<td>400,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,500,000</td>
</tr>
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</table>
Thank You
Noam Dotan, Comet-ME technical manager
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**Sales Cycle**

**Local Ecosystem**
- Demos and Sales
- Coordinate Local Ecosystem
- Installation
- Training and Service

**Local “Last Mile” Distributor**
- Import
- Recruit Local Distributors
- Training Centre - Distributors
- Finance network & PAYG
- Monitoring & DB management

**Farmer**
- Banks, International Orgs for loans
- Borehole Drilling
- Input Providers
- Agri-knowledge

**Company**
- Sales & Marketing
- HUB Technical support
- Adaptation to local needs
- International Network

**HUB (REP) – Regional/Country**
- Coordinate Local Ecosystem
Pump System Block Diagram

- SMPP directly to the irrigation system = minimal water usage + save cost of storage tank
- Moisture and temperature sensors

Switch box & Monitoring

Storage tank

Agricultural irrigation

PV array

Pump
The SMPP vs Grundfos (#1 Global Pump Supplier)

The SMPP has very high efficiency at a wide span of pump heads
IP Status

US application 2019 0234395 A1
Notice of allowance expected in April 2020
PCT Application WO 2019/150364 A1
PCT examiner quote from the written opinion:

“Consequently, the subject matter of claims 1, 2, 4-5, 50 is new and inventive as required under PCT Article 33(2)-(3) “