Opening Remarks

Mr. David Lecoque
CEO
ARE
## Agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker/Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 minutes</td>
<td>Opening remarks</td>
<td>Mr. David Lecoque, CEO, ARE</td>
</tr>
<tr>
<td>8 minutes</td>
<td>Facilitator</td>
<td>Mr. Deepak Mohapatra, Senior Officer – Business &amp; Market Development, ARE</td>
</tr>
<tr>
<td>8 minutes</td>
<td>Industry Announcement</td>
<td>Ms. Nadja Katnani, Project Manager, Messe Augsburg</td>
</tr>
<tr>
<td>8 minutes</td>
<td>Multi-technology white paper presentation</td>
<td>Ms. Diane Domkam, Public Affairs Manager, ENGIE Energy Access</td>
</tr>
<tr>
<td>8 minutes</td>
<td>Pitch 1</td>
<td>Mr. Christopher Pye, Global Segment Manager for Hybrid Microgrids, ComAp</td>
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<tr>
<td>8 minutes</td>
<td>Pitch 2</td>
<td>Mr. Marco Honsberg, CTO, EMPO-NI</td>
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<tr>
<td>8 minutes</td>
<td>Pitch 3</td>
<td>Mr. Swaleh Hassan, Strategic Business Development Manager, GadgetroniX</td>
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<tr>
<td>8 minutes</td>
<td>Pitch 4</td>
<td>Mr. Marcelino Silveira, Managing Director, Lighthouse Africa Investments</td>
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<tr>
<td>8 minutes</td>
<td>Pitch 5</td>
<td>Mr. Alban Brice Mongbo, Founder, BM Solutions</td>
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<tr>
<td>8 minutes</td>
<td>Pitch 6</td>
<td>Ms. Laura Corcoran, COO, Mr. Ghirmay Abraham, Executive Chairperson</td>
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<tr>
<td></td>
<td>Audience Q&amp;A</td>
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<tr>
<td>2 minutes</td>
<td>Closing remarks</td>
<td>Mr. Deepak Mohapatra, Senior Officer – Business &amp; Market Development, ARE</td>
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The **Alliance for Rural Electrification** (ARE) is the global association for the decentralised renewable energy (DRE) industry, catalysing private sector-driven markets for sustainable electricity services, creating jobs and powering equitable green economies.

<table>
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<tr>
<th>#1</th>
<th>200+</th>
<th>55+</th>
<th>3</th>
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<tbody>
<tr>
<td>Global DRE association</td>
<td>Members</td>
<td>Countries</td>
<td>Continents</td>
</tr>
</tbody>
</table>
ARE Members Regional Focus & Expertise

ARE Members Technologies

- Bioenergy
- Hydro
- Wind
- Power Components
- Energy Storage
- PV

ARE Members Systems

- Standalone
- Mini-grid
ARE Membership Services

1. Business & Market Development
2. Capacity Building
3. Policy & Advocacy
4. Communications & Marketing
Facilitated by

Mr. Deepak Mohapatra
Senior Officer – Business & Market Development
Alliance for Rural Electrification
Industry Announcement

Ms. Nadja Katnani
Project Manager
Messe Augsburg
OFF-GRID Expo+Conference (OEC)

The hotspot to meet international experts for self-sufficient power supply with green energy
SHORT SURVEY FOR VISITORS & EXHIBITORS –
THANKS FOR SPENDING ONLY A FEW MOMENTS TO SHARE YOUR THOUGHTS WITH US TO HELP IMPROVING OEC

The two-days event is the only neutral congress trade event in Europe focused on the self-sufficient solar, wind and hydropower energy supplies (off-grid sector). With its practice-oriented format consisting of a conference, trade fair and community network happening, it is the highlight in Augsburg, Germany.

Launched in 2011 as a workshop (by Phaesun), the event attracted more and more participants and met with ever-increasing enthusiasm, also among exhibitors and event partners. Since 2020 the Alliance for Rural Electrification is the official conference partner of the Off-Grid Expo+Conference.
Some impressions

OFF-GRID Expo

OFF-GRID Conference

OFF-GRID Networking

OFF-GRID TechDay

See more on the video
# Portfolio for independent Green Energy Supply & Cross Services

<table>
<thead>
<tr>
<th>Energy Production</th>
<th>Energy Storage</th>
<th>Distribution &amp; Management</th>
<th>Energy Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biogas</td>
<td>Cold Storage</td>
<td>Back-Up</td>
<td>Agri PV</td>
</tr>
<tr>
<td>Bioenergy</td>
<td>Energy Storage Heat</td>
<td>Maintenance</td>
<td>Cooling</td>
</tr>
<tr>
<td>Geothermal</td>
<td>Energy Storage Electricity</td>
<td>Energy Storage Salt</td>
<td>Commercial &amp; Industry</td>
</tr>
<tr>
<td>Hydropower</td>
<td>Hydrogen Storage</td>
<td>Fuel cells</td>
<td>Desalination/Drinking water</td>
</tr>
<tr>
<td>Photovoltaic</td>
<td>Micro-Girds</td>
<td>Monitoring</td>
<td>Institutions (Health, education...)</td>
</tr>
<tr>
<td>Solarthermal</td>
<td>Mini-Grids</td>
<td>Software</td>
<td>E-mobility</td>
</tr>
<tr>
<td>Small Wind-energy</td>
<td></td>
<td>Stand-Alone</td>
<td>Entertainment/Communication</td>
</tr>
</tbody>
</table>

### Financing
- Financial Support
- Public & private investors
- Pay-as-you-xx
- Crowdfunding
- Carbon Credits
- Bitcoins

### Cross Services
- Planning
- Project control
- System design
- Stakeholder-Involvement
- NGOs

### Policy
- Public Organisations

### Education & Science
- Institutes
- Research
- Training
- Universities

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Expo+Conference 2023
**Multi-action concept**

**OFF-GRID Expo**

Physical trade fair – about 50 exhibitors are presenting innovations, services of entire off-grid portfolio

- Young Talent Campus “Education Mile” with universities and institutes of the sector, including pitch of students (OFF-GRID Challenge)
- OFF-GRID Charity: Proceeds from the sale of donated products go to a good cause

**OFF-GRID TechDay**

- TechDay at the Conference Center on the day before. In timeslots exhibitors can offer product and service workshops tailored for the OEC visitors.
- Accessible for all ticket-holders

**Conference Stage**

- Main stage in the hall for 2 days of interactive, English-speaking program with high-quality sessions and panel discussions with more than 50 international top-class speakers
- From users for users: Insights into the latest innovative and practical projects
- Industry partner: Alliance for Rural Electrification

**Networking-hotspot**

- Great opportunities for intensive networking with the international off-grid community by matchmaking sessions, get-together in the evening and more
- THE annual network happening at the end of the year to set the mood for the following year
- 900* participants from over 30 countries (especially Northern and Southern Europe, East-Africa, Sub-Saharan Africa, South East Asia)

**Open access**

- Hall 1 at Messe Augsburg – the modern venue with short ways to all offers
- All visitors can benefit of TechDay & Expo+Conference – just one ticket for all

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Conference Program OEC 2023 overview

Keynote: Prof. Dr. Stefan Liebing, CEO Conjuncta (former chairman of the German-African Business Association)

Panels:

1. Women entrepreneurs and off-grid renewable energy – A status-quo check!
   (Moderator German-African Business Association, Wiebke Polomka)
2. Technical innovations in the off-gird energy sector with small wind systems
   (Moderator Airborne Wind Association, Stefanie Thoms)
3. Integrated solar cooking – Opportunities and challenges for cooking with the power of sun in developing countries
   (Moderator GIZ, Dorothea Otremba)
4. Utilisation of green hydrogen for off-grid energy access
   (Moderator Bayern Innovativ, Prof. Dr. Oliver Mayer)
5. Energy Storage Solutions - providing uninterrupted energy supply
   (Moderator ARE, Deepak Mohapatra)
6. Best practices on productive use of renewable energy (PURE)
   (Moderator ARE, Deepak Mohapatra)
Best practices on productive use of renewable energy (PURE)

Productive use encompasses a wide range of sectors, including agriculture, industry, and residential settings, where renewable energy technologies can enhance productivity, create jobs, and promote energy access, ultimately contributing to a more environmentally responsible and economically viable future. In this session, the speakers will showcase their projects and solutions highlighting the implementation of productive use of renewable energy.

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr. Shaukat Ali</td>
<td>Rural Electrification Expert, GIZ, Pakistan</td>
</tr>
<tr>
<td>Mr. Florian Martini</td>
<td>Project Manager, Phaesun GmbH</td>
</tr>
<tr>
<td>Mr. John Zamick</td>
<td>Founder &amp; CEO, SMARTER MICROGRID LIMITED</td>
</tr>
<tr>
<td>Mr. Tobias Merkel</td>
<td>Managing Director, SOLAR23 GmbH</td>
</tr>
<tr>
<td>Ms. Madeleine Raabe</td>
<td>Junior Researcher International Energy Transitions, Wuppertal Institut für Klima, Umwelt, Energie gGmbH</td>
</tr>
</tbody>
</table>

Ask for recordings of the conference: oec@messeaugsburg.de
Do you want to support us as a partner?
(abstract of partner list)
Join the community as an exhibitors!
(abstract of participants)
Virtual tour of the tradefair centre
Add-Ons: Discover Augsburg – the unique water management and much more!

The Augsburg water management system is unique worldwide with its design and was therefore inscribed on the UNESCO World Heritage List in 2019 with a total of 22 items, including drinking water works, monumental fountains, hydraulic structures, power plants, watercourses and canals.

Augsburg has a history that dates back over 2,000 years and is considered the second oldest city in Germany: Fuggerstadt (an official epithet for the cities of Augsburg and Weißenhorn) and Mozartstadt (the cities of Augsburg, Prague, Salzburg and Vienna. About 100km from Munich Airport.

See more about places of interest
See you at next OFF-GRID Expo+Conference!
Please feel free to get in touch with us!

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Sandra.boeck@messe-augsburg.de

OFF-GRID Expo+Conference
Website: https://www.off-grid-expo.com
LinkedIn: https://www.linkedin.com/company/off-grid-expo-conference/
Contact us: https://www.off-grid-expo.com/contact/contact

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Multi-technology white paper presentation

Ms. Diane Domkam
Public Affairs Manager
ENGIE Energy Access
Towards universal access to energy: Enabling a multi-technology approach in a mini grid environment

I4E: Powering Industries & Productive Uses of Energy with DRE

29 February, 2:00 – 3:30 PM
At current rates of electrification, a gap of over 550m people is still estimated to remain by 2030

Sub-Saharan Africa concentrates the lowest rate of electrification on the planet

Share of population without access to electricity:
- >75%
- 50% to 75%
- 25% to 50%
- <25%
Integrated Approach

We need an integrated multi-technology approach to achieve SDG7

A multi-technology approach across solar home systems, mini-grids, and solar business systems is critical to electrification.

Full cost of electricity delivered to client ($/kWh)*

The appropriate technology depends on density and cost: SHS are more appropriate for low density areas, mini grids more appropriate for off-grid villages / towns not near the grid, with SBS appropriate for either weak-grid or off-grid homes and businesses.

Off-grid solutions will dominate the market by 2030, with mini grids expected to play a big role.

Mini Grid Progress

Mini-grids are significantly behind

Number of mini-grids installed from 2010 to 2021 and the projected numbers for 2030

At current pace, only 12k mini grids would be installed by 2030, 148k short of the required 160k to achieve SDG 7
Overarching Challenges

Our conclusion is that we have not yet successfully implemented the multi-technology approach

1. At the **aggregate** level (given mix is still skewed towards grid and SHS, not mini grids)

2. At the **site** or **community** level, given limited coordination of procurement and synergies across technologies
Way forward

**Improved planning, tendering, funding models, and stakeholder engagement**

**Planning**
- Including a *business model viability assessment* in site selection, that includes *diverse technology* types
- Including a *risk assessment and allocation* framework

**Tendering Process Design**
- Exploring *desired impacts, objectives*, and requirements before selecting technologies
- Including *multiple technology types* in *tenders* to provide energy based on people energy needs and financial capabilities

**Funding**
- Including a *consortium of funders* that maintains their focus on preferred technologies, while supporting *integrated projects*

**Engagement**
*Inclusive engagement* with all players in the ecosystem with the aim to build programs that are *better aligned* with *market* and *end-user* needs

**New Business Models**
All technologies to be offered to customers an *“energy-as-a-service” model*, to enable consumers to access reliable and sustainable energy without the burden of owning and maintaining complex energy systems, and to be able to seamlessly transition between technologies as user demand changes
ENGIE Energy Access vision for the electrified rural community of the future
Mr. Christopher Pye
Global Segment Manager for Hybrid Microgrids
ComAp
Why Investing in Hybrid Microgrids Makes Business Sense?

Three Perspectives

Chris Pye
Global Segment Manager for Hybrid Microgrids
Hybrid Microgrid Investments Globally

› 10 – 12% market growth globally

Why?

› Rising prices of gas, fuel and electricity

› Decarbonisation of PG and transportation sectors

› Supplying the growing energy demands and serving those with limited or no access to electricity
Hybrid Microgrid Investments Globally

Which will be the Fastest Growing Regions by 2031?

› Asia Pacific
› Middle East and Africa
› Latin America

*According to a report by Guidehouse from 2022*
#1 Commercial Perspective

- Rising energy prices
- Privatisation of energy markets
- Cost effectiveness of RES
- Quick ROI
- Time to Market (easy to setup, modular, scalable)
#2 Sustainability Perspective

- Carbon and methane emissions limitation
- Energy security
- Energy quality
- ESG
#3 Technical Perspective

- Network transformation and reconfiguration
- Electrification of the transportation industry
- Peak demand exceeding base demand
- Energy Shifting
Market Disruptors – Renewables & Storage

› 1st wave - Renewables
  › Low MC2O
  › Scalable/Modular
  › Time to market
  › Zero emissions

› 2nd wave – Short-term Storage
  › Firming renewables
  › Energy shifting
  › Increasing resilience of traditional networks
  › Energy security

› 3rd wave…
Application Categories

- On-grid
- Off-grid or isolated
- EV charging integration
ComAp’s Microgrid and BESS Controls
ComAp’s Hybrid Service Offering

- Project Development Support
- Hybrid Control System Design
- Grid Connection Management
- System Configuration & Testing
- Commissioning
Thank you!

Christopher Pye  
Global Segment Manager for Hybrid Microgrids

chris.pye@comap-control.com

comap-control.com
Mr. Marco Honsberg
CTO
EMPO-NI
Tailor made PV-off-grid solutions for battery charging, productive use and water pumping

Solar technology for off-grid applications

EMPO-NI off-grid solutions – Wernigeroder Strasse 102 – 40595 Düsseldorf – sales@empo-ni.de

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EMPO-NI facts:
Innovations in off-grid solutions since 2007
Off-grid technology:
Charging, controlling and driving off-grid applications

Solar panel integrated battery charger (5Wp-80Wp 12V-48V)

Solar Panel MPPT controlled motor drives with GSM option

PV-off-grid fully automatic vegetable oil press systems

PV-pumping solutions PV-productive use solutions

Technology MADE in Germany
Engineered and MADE in Germany
SOLmini (Jbox integrated battery charge controller)

The robust battery charge controller

- 5Wp to 130Wp
- State-of-the-art PWM
- Cost efficient and robust design
- Highly reliable: operates < 100°C
- "Rainforest proof": IP65 protection
- Reduces cabling effort and potential errors
SOLAR DIRECT DRIVEs:
(SDD1.5kW-425V and SDD5.5kW-850V)
Driving 3-phase motors anywhere: PV-PUMPING, PRODUCTIVE USE...

Driving 3-phase motors of any application of up to 5.5kW
Made for outdoor: OUTDOOR IP54 (IP65)
ENVIRONMENTAL ROBUSTNESS: „Sahara tested“ Ta<45°C)
CONNECTIVITY (GSM/SMS)
REMOTE CONTROLLABILITY/ MONITORING
PAY-AS-YOU-GO implementation
PASSIVELY COOLED – no fans / no service required
Remote Control and Monitoring System (RMS):

- Start & Stop the Solar Direct Drive
- Control over actual and total performance
- Energy counter, Flowmeter input
- Operation parameter: Hours, DC voltage, DC current, heatsink temperature, motor speed etc.
- Error information: Short circuit, over temperature, over voltage, low well water level etc.
- Start modes: Auto start, Digital in etc.
- RUN timer and STOP timer read / write
- SDD configuration commissioning messages
SOLAR DIRECT DRIVEs:

Pressure control - Direct Drip Irrigation:

Solar Direct Drive (SDD)

PV-array (MC4 connector)

Submersible motor and hydraulic system

GSM

Level Switch

Filter

Pressure sensor

Well

EMPO-Ni off-grid solutions MADE IN GERMANY © 2020
Nigeria, Jos, Farmer Cooperative: Irrigation and productive use with and without Pay-As-You-Go, for Solar Direct Drives and SOLmini for battery charge controlling

Small irrigation solutions with PaygOps option:

<table>
<thead>
<tr>
<th></th>
<th>25m</th>
<th>30m</th>
<th>25m</th>
<th>29m</th>
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<tr>
<td>maximum circle dia [m]</td>
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<td>29</td>
<td>29</td>
<td>30</td>
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<td>hourly water [liter/m²]</td>
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<tr>
<td>water gun model</td>
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<tr>
<td>Power &quot;P2&quot; [kW]</td>
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<tr>
<td>SDD1.5kW-425V / PayGo</td>
<td>✓</td>
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<tr>
<td>qty 60cell PV-panels</td>
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<td>7</td>
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<tr>
<td>qty 72cell PV-panels</td>
<td>3</td>
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<td>4</td>
<td>6</td>
<td>8</td>
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EMPO-NI off-grid solutions MADE IN GERMANY © 2021
EMPO-NI Solar Direct Drive off-grid Oil press Kit 1.1kW MPPT+ (pre)-heater control

- Processing up to 20kg seeds / kernels per hour
- Up to 30,000 liter of high quality vegetable oil p.a.
- MPPT digital (pre-) heating and oil pressing control
- 7 PV-panels (60 CELLS) to make it run.
- Compliance with international safety and food processing standards
- using high-quality stainless-steel materials and hardened extruder screws for longest lifetime
- GSM remote control / PAY-AS-YOU-GO ready
- GEO location tracking
- MADE IN GERMANY

Winner of 2022 Bavarian State Award

EMPO-NI off-grid solutions MADE IN GERMANY © 2021
**PV-solar oilpress overview**

**Typical performances and PV-solar panel requirements**

<table>
<thead>
<tr>
<th>Technical Specifications</th>
<th>EMPRESS0.37kW</th>
<th>EMPRESS0.75kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press Form and Method</td>
<td>Screw press / Cold Press Method</td>
<td>Screw Press / Cold Press Method</td>
</tr>
<tr>
<td>Motor Power, #PV-panels 250Wp, 60cells</td>
<td>370 W, only 3 PV-panels of 250Wp min.</td>
<td>750 W, only 5 PV-panels of 250Wp min.</td>
</tr>
<tr>
<td>System, 3-phase motor MPPT control unit</td>
<td>EMPO-NI SDD1.5kW-425V</td>
<td>EMPO-NI SDD1.5kW-425V</td>
</tr>
<tr>
<td>Gearbox</td>
<td>Helical Gear Shaft</td>
<td>Helical Gear Shaft</td>
</tr>
<tr>
<td>(Pre-) heating</td>
<td>250 Watt digital temperature controller in SDD1.5kW-425V</td>
<td>350 Watt digital temperature controller in SDD1.5kW-425V</td>
</tr>
<tr>
<td>Length x Width x Height</td>
<td>840 x 240 x 550 mm</td>
<td>840 x 240 x 540 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>44 kg</td>
<td>65 kg</td>
</tr>
</tbody>
</table>

**Hourly Capacity**
- Between 1 and 8 kg // Optimal 3 kg
- Between 1 and 20 kg // Optimal 7 kg
- (It may vary according to the input grain size, homogeneity, temperature and purity)

**Scope of Application**
- Food processing, Chemicals, Pharmacy and Others
- Food processing, Chemicals, Pharmacy and Others

<table>
<thead>
<tr>
<th>Technical Specifications</th>
<th>EMPRESS5.5kW (4kW)</th>
<th>EMPRESS1.1kW (1kW / 1.5kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press Form and Method</td>
<td>Screw Press / Cold Press Method</td>
<td>Screw Press / Cold Press Method</td>
</tr>
<tr>
<td>Motor Power, #PV-panels 250Wp, 60cells</td>
<td>4KW (5.5KW), only 18 PV-panels of 250Wp</td>
<td>1.1kW / 1.5kW, only 7 (10) PV-panels of 250Wp min.</td>
</tr>
<tr>
<td>System, 3-phase motor MPPT control unit</td>
<td>EMPO-NI SDD5.5KW-850V</td>
<td>EMPO-NI SDD1.5kW-425V</td>
</tr>
<tr>
<td>Gearbox</td>
<td>Helical Gear Shaft</td>
<td>Helical Gear Shaft</td>
</tr>
<tr>
<td>(Pre-) heating</td>
<td>600 Watts digital temperature controller in SDD5.5KW-850V</td>
<td>500 Watt digital temperature controller in SDD1.5kW-425V</td>
</tr>
<tr>
<td>Length x Width x Height</td>
<td>1,550 x 800 x 2,200 mm</td>
<td>1,060 x 280 x 590 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>550 kg</td>
<td>85 kg</td>
</tr>
</tbody>
</table>

**Hourly Capacity**
- Between 1 and 80 kg // Optimal 40 kg
- Between 1 and 40 kg // Optimal 12 kg
- (It may vary according to the input grain size, homogeneity, temperature and purity)
SOLAR DIRECT DRIVE kits:

For productive use: SDD + industrial motor kit

Replacement of inefficient single phase motors in any motor driven application

EMPO-NI industrial drive kits use a minimum amount of standard PV panels

EMPO-NI industrial induction motors are optimized to operate at low voltage

<table>
<thead>
<tr>
<th>Number of PV-panels</th>
<th>Motor Power [KW]</th>
<th>Solar Direct Drive SDD1.5kW-425V</th>
<th>Rated speed at 50Hz</th>
<th>Motor Size</th>
<th>Coupling</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0.37kW</td>
<td></td>
<td>4p 1450rpm 2p 2850rpm</td>
<td>71</td>
<td>stand food/flange</td>
</tr>
<tr>
<td>4</td>
<td>0.55kW</td>
<td></td>
<td>4p 1460rpm 2p 2870rpm</td>
<td>80</td>
<td>stand food/flange</td>
</tr>
<tr>
<td>5</td>
<td>0.75kW</td>
<td></td>
<td>4p 1450rpm 2p 2860rpm</td>
<td>80</td>
<td>stand food/flange</td>
</tr>
<tr>
<td>7</td>
<td>1.1kW</td>
<td></td>
<td>6p 950rpm 4p 1450rpm 2p 2880rpm</td>
<td>90</td>
<td>stand food/flange</td>
</tr>
<tr>
<td>10</td>
<td>1.5kW</td>
<td></td>
<td>6p 950rpm 4p 1450rpm 2p 2890rpm</td>
<td>90</td>
<td>stand food/flange</td>
</tr>
</tbody>
</table>

* of 60-cells

Drive kits for 2.2kW, 4kW and 5.5kW available

EMPO-NI off-grid solutions MADE IN GERMANY © 2020
Applications: Stop Post Harvest Loss

Cooling solutions: Battery less and MPPT controlled coolness

**Solar Direct Drive SDD5.5kW-850V (MPPT)**
- pressure and temperature control of compressor set
- GSM modem monitoring and remote control
- System control functionality

**Solar Direct Drive SDD5.5kW-850V (MPPT)**
- pressure / temperature control fan
- control of circulation pump
- Enhanced system control functionality

**Technical Expert (not on sale)**

**Heat exchanger / condensor**

**Compressor set**

EMPO-NI off-grid solutions MADE IN GERMANY © 2023
New Applications: SDH800-100V

Heating solutions: Cooking or hot water MPPT performance

Solar Direct heat control SDH800-100V (MPPT)
- only 2 x 72 cells (144 cells) PV-panels required
- Temperature control
- MPPT control
- Auxiliary pump control

1 or 2 PV panels
60 cells/72 (144) cells

Heat plate for cooking purposes
(full stainless steel version available)

Water heater element
Stainless steel

+ Circulation pump ca. 6W

EMPO-NI off-grid solutions MADE IN GERMANY © 2024
SOLAR DIRECT DRIVEs:
Tailor made motor drive solutions and necessary PV-panel power

Solutions for standard industrial motors
Solutions for PV-pumping solutions (example pump head and pump discharge)
Other types on request: sales@empo-ni.de

Performance PV-panels!

PV array selection criteria:
- Open circuit voltage (Voc) < 850V (SDD5.5kW)
- Open circuit voltage (Voc) < 425V (SDD1.5kW)
- Minimum cost of PV-array

NEW! low cost KIT with pump / motor

LES AND OMISSIONS EXCEPTED
EMPO-NI off-grid solutions

Visitor’s centre:
EMPO-NI off-grid solutions
Erkrather Strasse 401
40231 Düsseldorf
GERMANY

➢ Contact us for technical inquiries
  engineering@empo-ni.de
➢ Contact us for commercial inquiries:
  sales@empo-ni.de

www.empo-ni.de

Headquarter:
EMPO-NI off-grid solutions
Wernigeroder Strasse 102
D-40595 Düsseldorf
GERMANY

fon: +49 (0) 211 361 848 64
fax: +49 (0) 321 212 841 95

EMPO-NI off-grid solutions MADE IN GERMANY © 2020
Mr. Swaleh Hassan
Strategic Business Development Manager
GadgetroniX

Gadgetronix was founded in Tanzania’s technology industry in 2014 and is now a supplier, consultant, designer, project implementer, and solution provider for various clean/renewable energy types. We excel in our customer support services with state of the art repair centers across Tanzania.

Working with a team of highly competent employees, including over sixty full-time Expert Technicians, Electrical/ Mechanical Engineers, and Quantity Surveyors. Gadgetronix has been able to specialize in a variety of areas, including Energy Solutions, Water Solutions, Security Solutions, and Telecommunication Solutions.
Where we are

GadgetroniX Head Quarters
Old NSSF Building, Behind Manji’s Metropole, Arusha, Tanzania.
+255 677 061 468 / +255 677 146 654

GadgetroniX Dar Es Salaam
Corner of Nkrumah and Swahili Street, Dar es Salaam, Tanzania.
+255 620 602 009 / +255 620 007 170

GadgetroniX Warehouse
HPVC+V85, Njiro Road, Arusha, Tanzania.
+255 677 146 654 / +255 677 061 468

GadgetroniX Njiro Complex
Showroom Ground Floor, Shop #2, Njiro Shopping Complex Arusha, Tanzania.
+255 677 146 654 / +255 677 061 468

GadgetroniX Zanzibar
Plot 559, Nyerere Road, Along Airport Road, Kiembe Samaki,
+255 677 146 654 / +255 67 706 1468

GadgetroniX Nairobi
Vishnu Industrial Park, Plot LR No. 2/10728 Ruiru
Along Thika Super Highway
+254 722 116 007
Energy Solutions

1. Off grid solar / Grid tie solar
2. Battery-powered backup systems
3. Solar refrigeration
4. Power Generators
5. Hybrid systems
6. Portable power solutions

Benefits of Solar Energy

- **Saves Money**: Tired of paying electricity bills? Solar energy provides a free source of electricity with no monthly bills.
- **Reliable Electricity**: No more power cuts and blackouts. With solar power, you can have 24-hour access to power with no interruptions.
- **Access Everywhere**: Solar power can be connected to your home or business in any location, no matter how remote.
- **Saving the Planet**: Solar power generates no toxic emissions & cleans energy without depleting the earth's supply of fossil fuels.
Water Solutions

1. Solar water pumping
2. Electric water pumping
3. Hybrid water pumping
4. Solar water heating
5. Water filtration / treatment
6. Solar water dispensing

Benefits of our water solutions

- **Cost Savings**: Over time, these systems can lead to significant cost savings in terms of reduced energy bills, lower maintenance expenses, and government incentives (where applicable).
- **Energy Efficiency**: All our systems are properly designed and maintained and are highly energy-efficient, reducing overall energy consumption and associated costs.
- **Reliable Supply**: They ensure a consistent and reliable water supply for irrigation, heating, drinking water, or other applications, enhancing overall quality of life and productivity.
- **Environment**: Contribute to environmental sustainability by reducing carbon footprint and promoting a cleaner and greener energy source.
Energy Projects

KUBU KUBU TENTED LODGE

Client: Tanganyika Wilderness Camps
Client Type: Hospitality
Project Category: Battery Storage, Off-Grid Solar, Remote Monitoring
Location: Serengeti

- 212.55 kWp Photovoltaic panels
- 400 kWh of battery storage
- 2 x ATESS HPS 10 kW hybrid inverter/charger

COCOON INC/TAWIRI

Client: Cocoon Inc.
Client Type: Research Organization
Project Category: Battery Storage, Off-Grid Solar, Remote Monitoring
Location: Serengeti

- 216 kWp of Photovoltaic panels
- 8.08 kWh of battery storage using ATESS Solar Battery AER31-2070P
- 1 x VICTRON Multiplus II 3.5kVA 24V inverter charger

HANSPAUW AUTOMECHS

Client: Hanspauw Automechs Ltd
Client Type: Manufacturing Industry
Project Category: Power backup, Remote monitoring
Location: Arusha

- 10kWh Freedom Won HV LifePO4 Battery
- ATESS HP350 10kVA Hybrid Inverter Charger
- Remote monitoring
Water Projects

**MARUMBI RESIDENCE RESORT**
- Client: [Name]
- Project Description: Solar Water Heating
- Location: [Location]
- 10 x Calpak 300L Closed Loop Solar Water Heaters

**GAWIDU VILLAGE WATER PROJECT**
- Client: [Name]
- Project Description: Solar Water Pumping
- Location: [Location]
- Pump System: LOEENTZ 2002-600 HP-10-2
- Total dynamic head: 75 m
- Flow rate: 10 m³/day
- Solar generation: 0.41 kWp

**LAHIA TENTED LODGE**
- Client: [Name]
- Project Description: Solar Water Heating, Battery Storage
- Location: [Location]
- 3 x 7.5 kW Electric Submersible Pumps
- 1 x 5 kW Electric Submersible Pump
- 3 x 4 kW Electric Surface Pump
- 2 x Swimming Pool Pumps
### Our Product Partners

<table>
<thead>
<tr>
<th>Freedom Won</th>
<th>Fronius</th>
<th>Lorentz</th>
<th>EcoFlow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Victron Energy</td>
<td>Sun Synk</td>
<td>Ybeier</td>
<td>Nochen Green Energy</td>
</tr>
<tr>
<td>Eternity Technologies</td>
<td>ATESS</td>
<td>AES</td>
<td>Goodwe</td>
</tr>
<tr>
<td>Suntree</td>
<td>Anern</td>
<td>JA Solar</td>
<td>Trojan</td>
</tr>
<tr>
<td>ENERGIE</td>
<td>Grundfos</td>
<td>Calpak</td>
<td>Lowara</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Our Clients
GADGETRONIX.NET LTD

energy@gadgetronix.net
bdm@gadgetronix.net

+255 677 061 468
+255 677 007 111

www.gadgetronix.net
LIGHTHOUSE AFRICA INVESTMENTS is a company registered according to the company laws of the Kingdom of Eswatini in 2020. The main objective of the company is to use renewable sources to generate energy and reusable byproducts to grow the economy in the kingdom of Eswatini.

Thus, the four objectives of the project are: -

1. Produce Energy (Renewable energy)
2. Job creation (regional value creation)
3. Increase Agricultural productivity (through natural soil fertilization)
4. Fight climate change (releasing negative carbon)
This is being achieved through the efforts of our knowledge driven team and network of internationally qualified experts within the fields of renewable energy technologies sustainable development and engineering.

We are dedicated to creating sustainable solutions and enriching lives by reducing energy poverty, providing long lasting and consistent solutions for households, businesses and communities.

LHAI acts seeks to be the Europe-Africa Bridge, transferring proven and innovate technologies to Africa.

We enable African technicians and engineers to implement, operate and maintain this technology in Africa. We create local jobs and infrastructure especially in rural areas.
OUR KEY FOCUS AREAS
Our work aims to bring clean, renewable, reliable electricity to our customers and the grid. Our goal is to help our customers implement micro and mini grid technology using solar and other renewable energy sources for their facilities. We also provide standalone solar installations, utility scale solar farm development, renewable energy financial services and a wide array of engineering services.

CONSULTING
Energy Audit & Feasibility Study
Our consulting services provide insight into the way these projects are developed, financed, installed and operate. Our goal is to analyze the customer’s needs and Energy Management to determine the different ways in which a project can move forward and implement the best plan.
Bioenergy and CO2 Capture by nature
Next Generation Large Scale Biomass Utilization
BioChar Closed Loop Concept
**Product**

BioChar Refinery

“We put the charburner’s pile into a box”

- In our special designed retorts (5m3), we can control and process (1-500mm forest and agricultural biomass)
- No wear and tear
- No moving parts which can get jammed
- Rock solid mechanics with high degree of automation
- Digital SCM and traceability (technology Blockchain)
BioChar Refinery

• We achieve a biochar quality of above 98% pure carbon

• Our process is approved by legal authorities to store 3t of CO₂ in 1t of our biochar
Advantages & Market

- Given the fact that there are no plants locally that use biomass to generate energy and sustainable byproducts for consumers, and that all such products are imported from the neighboring South Africa, this puts us at an advantage of being the first in the country to offer such products and fully capture the local market.

- From our plant, one of the byproducts is biochar. Biochar is a fine-grained charcoal made by pyrolysis of agricultural biomass. Biochar is widely used in different kinds of industrial application, e.g., in gas purification, gold purification, metal extraction, water purification, medicine, sewage treatment, air filters in gas masks and respirators, filters in compressed air and many other applications. However, the main focus in the Biochar projects in rural agricultural region is the production of Terra Preta for local soil fertilization and carbon sequestration. Terra Preta has been used as a soil improver by many different crops and in numerous regions for over 2500 years.

- LHAI will have to establish a local market for the Terra Preta and sell it to the agricultural sector in the kingdom for improved crop yields. Instead of importing fertilizer from South Africa, the Agricultural supplies businesses will buy locally thereby reducing costs (importation) and increasing profitability.

- Biochar has different kinds of industrial applications which LHAI can offer to different customers in the different sectors of the economy as listed below:
**Application**

- **Medical uses** - Activated carbon is used to treat poisonings and overdoses following oral ingestion. It is also used to treat diarrhoea, flatulence and indigestion.

- **Environmental applications** - Activated carbon is usually used in water filtration systems, Spill clean-up, Groundwater remediation, Drinking water filtration, Air purification. Volatile organic compounds capture from painting, dry cleaning, gasoline dispensing operations, and other processes.

- **Agriculture uses** - Activated carbon is an allowed substance used by organic farmers in both livestock production (as a pesticide, animal feed additive, processing aid, nonagricultural ingredient) and as a disinfectant wine making for use as a processing agent to absorb brown color pigments from white grape concentrates.

- **Gas purification** - Filters with activated carbon usually used are in compressed air and gas purification to remove oil vapors, odor, and other hydrocarbons from the air.

- **Chemical purification** - Activated carbon is commonly used on the laboratory scale to purify solutions of organic molecules containing unwanted colored organic impurities.

- **Mercury scrubbing** - Activated carbon, often infused with Sulphur or iodine, is widely used to trap mercury emissions from coal-fired power stations, medical incinerators, and from natural gas at the wellhead.

- Another important benefit to be derived from the production process includes the construction of containers fitted with the district cooling system for cooling or refrigerating farm produce.
SOLAR POWER
Wind Power
Biomass Energy Development

Together with our partners, we are involved in solving socially-created environmental problems through thermal utilisation of agro-industrial biomass waste. The business comprises the design, engineering, delivery and service of biomass plants fired with all forms of biomass, primarily wood chips, wood waste, sander dust and bark, but also other biomass fuels such as distillers grain, poultry litter, and meat and bone meal, as well as straw and other agricultural residue. LHAI also carries out operation and maintenance, consultancy work, overhaul and maintenance activities, and assists in the optimisation of the operating conditions for existing plants.

Solar Energy Development

We offer engineering and technical support for solar energy access solutions. Our expertise includes all facets of project management, from technical and commercial studies of Solar PV energy options to project feasibility, energy audit, system design, equipment tenders, installation, and after-service support including monitoring and evaluation.
Our team
Contacts

• Eswatini
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  P. Box 2 | Mbabane | H100
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  Local Ground Director
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  +268 7602 1986
  +27 65 537 5492
  Email: lighthouse.afrik@gamail.com

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  Email: anton.aschbacher@e4f.eu
Mr. Alban Brice Mongbo
Founder
BM Solutions
Powering Industries and Productive Uses of Energy with DRE

Presented by Dr. Alban Brice MONGBO
Founder – Head of Business Development
Founded in 2017 and operating in Contructions and Energy in Republic of BENIN.

In 2023, the company generated **110,000 USD** as revenue on water solar pumps.

Our ambition is to become the leading company in Benin in terms of the supply and installation of water solar pumps for *productive use of energy* by 2025.

Our expansion plan is targeting the small farmers (<1Ha) who are around **25,000** in BENIN.

Ambition **2027: 2,500 solar pumps sold and installed.**
The problem

Horticulture and rice producers are located in three main areas: Grand-popo, Seme-Podji and Malanville.

Their activity requires a huge quantity of water of daily basis.

They are currently using motor pumps to supply water to the crops.

The motor pumps consumption is 2 liters min/day while fuel cost is increasing (1.12 USD per liter).

Sometimes, farmers are obliged to borrow money to buy fuel. Sometimes, they cannot supply water to crops and this affects the productivity and the revenue.

Motor pumps required also regular maintenance and can only last one year maximum.

Country status

- Population : 12 millions
- 50% of the population are in agriculture,
- 25% of GDP depends on the agriculture
- Agriculture represents 80% of the exportations

Agriculture is a key sector in BENIN
Our alternative to the situation described previously is the water solar pumps that eliminates all the fuel expenses and ensure a normal daily water supply to the crops to replace the current motor pumps.

**Product : solar surface pump**
- powered by solar panels
- Supplied with 2 years warranty and 10 years warranty for panels
- Surface pump like the current pumps
- Same water rate as the current pumps
- Removable
- Last up to 8 years
- No maintenance fees
Results and Feedbacks

Market

- Number of customers increases by 25% every year from 2021 (company revenue increased).
- One-time investment (cash or progressive for 2 years only) company to daily expenses in fuel.
- Less stress for farmers because of absence of pump maintenance.
- Revenue increased along with production because of the possibility to produce even in the dry seasons.
- Increase of the resilience of families as their revenue is increasing.
Our demands

- Manufacturers to reduce the pump prices to increase the affordability for farmers.
- Manufacturers to design PAY-GO enabled products.
- Financing companies to support the local solar companies in products acquisition.
- More capacity buildings for local solar company in order to easily raise funds.
- Increase of the resilience of families as their revenue is increasing.
Thanks for your attention

Dr. Ing. Alban Brice MONGBO
Founder - Head of Business Development
contact.bmsolutions@gmail.com
Tel: +229 97972941
Ms. Laura Corcoran
COO
Aptech Africa

Ms. Ghirmay Abraham
Executive Chairperson
Aptech Africa
Bringing Solar Powered Water Pumping Solutions to Somaliland
EPC Solar Energy and Water Pumping Company
Mission
To provide access to clean electricity and water to improve people’s lives.

Vision
Aptech Africa as the leading EPC company for implementation of renewable projects across Africa
Applications

SOLAR APPLICATIONS
- Off-grid and Hybrid Solutions
- Energy Storage Technology
- Water Heaters
- Street Lights

WATER APPLICATIONS
- Borehole Drilling
- Water Pumping and Distribution
- Water Treatment
- Irrigation

POWER TRANSMISSION & DISTRIBUTION
- Power Transmission
- Substation
- Power Distribution
Challenge of Water Access in Somalia

- Hargeisa
- Dilla Town
- Boroma Town
Supply and Installation of electromechanical equipment for Laasdhure Boreholes

<table>
<thead>
<tr>
<th>Item</th>
<th>Site</th>
<th>PV Capacity (KWp)</th>
<th>Installed Diesel Generators</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Laasdhure - LD4</td>
<td>75.6</td>
<td>100kva</td>
</tr>
<tr>
<td>2</td>
<td>Laasdhure - LD10</td>
<td>105.84</td>
<td>150KVA</td>
</tr>
<tr>
<td>3</td>
<td>Laasdhure - LD11</td>
<td>60.48</td>
<td>75KVA</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td>241.92</td>
<td>448</td>
</tr>
</tbody>
</table>
Supply and Installation of electromechanical equipment for Four Dilla Dams in Dilla

<table>
<thead>
<tr>
<th>Item</th>
<th>Site</th>
<th>PV Capacity (KWP)</th>
<th>Installed Diesel Generator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Garbida</td>
<td>8.64</td>
<td>10KVA</td>
</tr>
<tr>
<td>2</td>
<td>Caro Agaranug</td>
<td>8.64</td>
<td>10KVA</td>
</tr>
<tr>
<td>3</td>
<td>Qabridhawed</td>
<td>8.64</td>
<td>10KVA</td>
</tr>
<tr>
<td>4</td>
<td>Dilla</td>
<td>8.64</td>
<td>10KVA</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td>34.56</td>
<td>128</td>
</tr>
</tbody>
</table>
Supply and Installation of electromechanical equipment for Boroma water supply improvement project
Impact

- 1,000,000+ people with access to water
Audience Q&A

I4E Series: Powering Industries & Productive Uses of Energy with DRE

Facilitator
Mr. Deepak Mohapatra
Senior Officer – Business & Market Development
Alliance for Rural Electrification

Ms. Nadja Katnani
Project Manager
Messe Augsburg

Mr. Marco Honsberg
CTO
EMPO-NI

Mr. Alban Brice Mongbo
Founder
BM Solutions

Ms. Diane Domkam
Public Affairs Manager
ENGIE Energy Access

Mr. Swaleh Hassan
Strategic Business Development Manager
GadgetroniX

Ms. Laura Corcoran
COO
Aptech Africa

Mr. Christopher Pye
Global Segment Manager for
Hybrid Microgrids
ComAp

Mr. Marcelino Silveira
Managing Director
LHAI

Ms. Ghirmay Abraham
Executive Chairperson
Aptech Africa
Closing Remarks

Mr. Deepak Mohapatra
Senior Officer – Business & Market Development
Alliance for Rural Electrification
See you at the next I4E showcase webinar on 25.04.2024

www.ruralelec.org