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Canada

MORE POWER TO WOMEN

The WERELIS project's impact
on livelihoods, communities, and policy



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engagement, and continued collaboration.

More power to women

The **WERELIS** project's impact on
livelihoods, communities, and policy



Foreword

Bhutan's energy sector plays a crucial role in driving economic growth, improving livelihoods, and supporting sustainable development. As the country faces growing challenges from climate change, water variability and energy security, there is an urgent need for innovative and resilient solutions. This is particularly important for agriculture, which continues to face a labour shortages, water scarcity and limited market access.

Despite Bhutan's abundant water resources, only about 20% of agricultural land has access to irrigation. The country's rugged terrain creates significant physical and structural challenges for developing and maintaining irrigation systems. Climate change exacerbates these issues, threatening livelihoods and placing an increasing burden on women, who play a central role in agricultural production. In response, Bhutan is prioritising climate-resilient technologies, including renewable energypowered lif irrigation systems such as solar PV pumping. These solutions can expand access to irrigation water, improve agricultural productivity, reduce drudgery and decrease reliance on fossil fuels.

The Women's Empowerment through Renewable Energy Powered Lif Irrigation Systems (WERELIS)

project (2023–2026) was established to address irrigation water insecurity through renewable energy-powered irrigation systems, while contributing to Bhutan's transition towards a low-carbon and inclusive energy future.

The project was funded by the International Development Research Centre (IDRC) and implemented by the International Centre for Integrated Mountain Development (ICIMOD), in partnership with Department of Energy, Royal Government of Bhutan and field partner Bhutan Ecological Society.

Women were at the centre of this approach. WERELIS supported women to take on roles that went beyond using the irrigation systems. They were trained to operate and maintain the systems, took on leadership roles in the water users' association and participated in decisions about water use and irrigation management.

This booklet captures what changed through the project. It brings together the experiences of women farmers, community leaders, entrepreneurs, government officials and educators, alongside evidence of changes in livelihoods, communities, institutions and policy. It also highlights lessons for the future: what has worked, what challenge remain, and what these experiences can teach us about scaling RE-powered irrigation to build more resilient mountain livelihoods in Bhutan and the wider Hindu Kush Himalaya.



Karma Penjor Dorji
Director General
Department of Energy
Ministry of Energy and Natural Resources
Royal Government of Bhutan



Pema Gyamtsho
Director General
International Centre for Integrated
Mountain Development (ICIMOD)

As Bhutan works towards its Five-Year Plan targets for agricultural development and continues its transition towards a low-carbon and inclusive energy system, the lessons from WERELIS offer a practical model. They show how climate resilience, women's empowerment and energy security can be pursued together as mutually reinforcing goals.

We extend our sincere gratitude to all those who contributed to the WERELIS project over the past three years. We deeply appreciate the support and collaboration of the Department of Agriculture, Department of Infrastructure Development, the Department of Water, Bhutan Chamber of Commerce and Industry, local governments, project partners, technical and academic institutions, private sector actors, and the many government officials, practitioners, trainers, participants, farmers, and community members who generously contributed their knowledge, time, and expertise throughout the project.

Their collective contributions, from planning and research to implementation, capacity strengthening, piloting, monitoring, and learning, were central to demonstrating the potential of renewable energy-powered irrigation to empower women, strengthen rural livelihoods and build climate resilience in Bhutan.

We hope the experiences and lessons captured in this booklet will inspire continued collaboration and support efforts to scale gender-responsive renewable energy solutions across Bhutan and other mountain regions



Kapil Kapoor
Regional Director
International Development Research
Centre (IDRC)

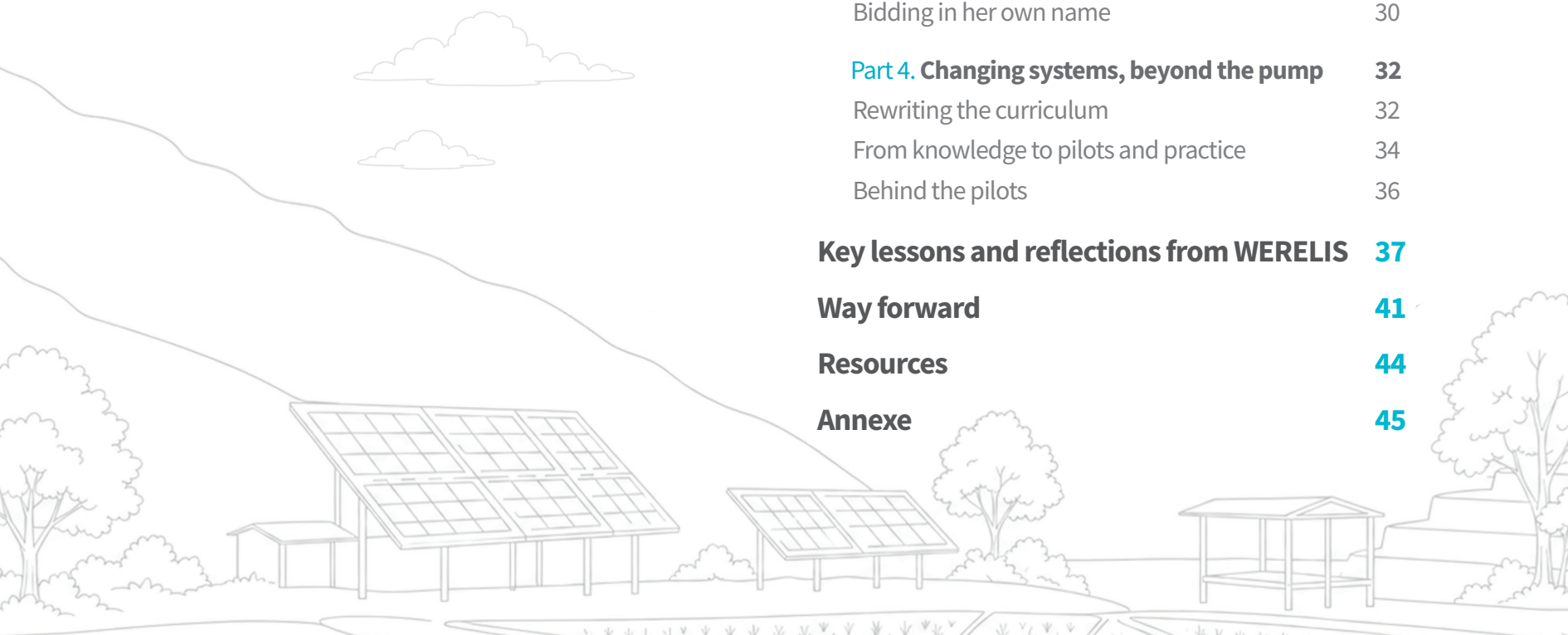


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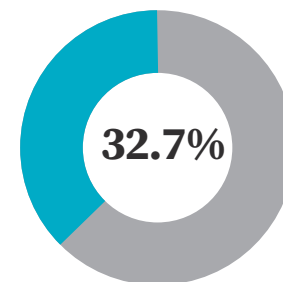
Women and Bhutan's food security

Women make up more than half of Bhutan's agricultural workforce, and that share has been growing. As men increasingly migrate from rural areas to urban centres in search of work, women are taking on a larger share of agricultural work. Rural-to-urban migration accounts for 32.7% of internal migration in Bhutan and is predominantly male.¹

Agriculture remains at the heart of Bhutan's rural communities, sustaining livelihoods and underpinning the country's food security. The 13th Five-Year Plan sets a target of increasing agriculture's contribution to gross domestic product (GDP) from Bhutanese ngultrum (BTN) 36.5 billion [United States dollar (USD) 385 million] in 2023 to BTN 58.7 billion (USD 619 million) by 2029.² Meeting this target depends on the workforce already sustaining the sector, the majority of whom are women. That also means the difficulties of farming fall hardest on them.

Irrigation is among the most significant of those difficulties. One of the fundamentals of crop production, it remains out of reach for much of the country.

Meeting Bhutan's agricultural targets depends on the workforce already doing the work. Most of that workforce is women.



of internal migration in Bhutan is rural-to-urban migration, and it is predominantly male.

¹National Statistics Bureau. (2018). *Rural-urban migration and urbanization in Bhutan*.

²As of 9 September 2026, 1 USD = BTN 94.82

The challenge

Water, work, and who carries the weight

Pema Zangmo is 23. Before the solar-powered irrigation system reached her village, she and her father walked to distant mountain streams and carried water back on their backs for their crops. They spent more than four hours a day hand-irrigating for around 20 to 25 days during the growing season.

Across Bhutan, farmers face the same problem. The land they farm is scarce. Bhutan's rugged mountain terrain means only about 3% of the country's land is suitable for agriculture, and roughly 80% of that land lacks year-round irrigation.³ Farms depend on rainwater and traditional gravity-fed systems that are seasonal, easily damaged, and increasingly vulnerable to climate change. The result is lower yields, less crop diversity, unstable incomes, and land left fallow. In some villages where water channels do exist, water is shared by rotation, and a farmer can wait up to 11 days for their turn, long enough for a crop to fail. Those who cannot wait turn to diesel. For three years, Khedo carried a 50-kilogram pump and 12 litres of diesel to the river and back for every irrigation trip, spending roughly BTN 1,000 (USD 10.5) each time.

Because women make up more than half of Bhutan's agricultural workforce, this burden falls unevenly on them. Traditionally, responsibility for irrigation has rested with men. As men migrate and women take on a greater share of farming, this division is shifting. Women are increasingly

responsible for fetching water, clearing irrigation channels, and keeping households running. They carry out 71% of all (on-farm and off-farm) unpaid care work in Bhutan, two and a half times as much as men.⁴

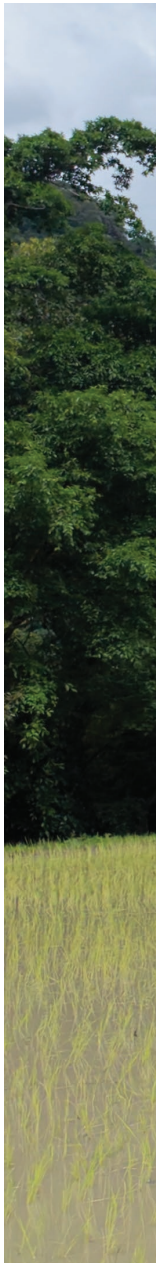
Bhutan's fast-flowing rivers and mountain landscape offer a natural solution. Renewable energy (RE)-powered lift irrigation systems draw water from rivers, streams, or groundwater and deliver it to farms at higher elevations. They reduce reliance on diesel, extend irrigation to areas conventional systems cannot easily reach, and reduce the time and labour required to bring water to fields. In doing so, they support more reliable agricultural production and enable multiple cropping while advancing Bhutan's transition to cleaner energy.

Yet the potential of RE-powered irrigation goes beyond the technology itself. Across Bhutan, women already farm the land and manage the water it depends on, yet they have little say in the irrigation systems that serve them, from design and installation to daily operation and repair. In the RE workforce, women specialising on RE has largely remained confined to hydropower. This reflects not a lack of ability but a lack of training opportunities and systems that are rarely designed with their needs in mind.

Addressing these challenges requires strategies that are not only climate-responsive but explicitly gender-responsive.

³ Department of Energy. (2025). *Landscape assessment of renewable energy-powered lift irrigation systems in Bhutan*. Ministry of Energy and Natural Resources, Royal Government of Bhutan.

⁴ National Commission for Women and Children. (2019). *Accounting for unpaid work in Bhutan*. Royal Government of Bhutan.



about

3%

of the country's
land is suitable for
agriculture,



80%

of that land
lacks year-round
irrigation.³

Women are
increasingly
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fetching water,
clearing irrigation
channels, and keeping
households running.



What is the WERELIS project?

Women's Empowerment through Renewable Energy Powered Lift Irrigation Systems (WERELIS) is a three-year project (2023–2026) that puts women at the centre of Bhutan's shift to solar-powered irrigation. It set out to address two problems together: unreliable irrigation water on Bhutan's farms, and women's limited role in the RE systems that could resolve it.

The project worked on both. On the technical side, there are renewable-energy-powered lift irrigation systems that draw water from rivers and streams and deliver it to farms on higher ground, replacing diesel pumps and unreliable gravity-fed systems. Alongside this, the women who already do most of Bhutan's farming were trained to operate, maintain, lead, and make decisions about these systems, rather than simply benefit from them.

By making irrigation more reliable, the project also supports Bhutan's food security and its ambition to grow agriculture's contribution to GDP. Replacing diesel pumps with solar-powered lift irrigation systems brings Bhutan's farms closer to a low-carbon, climate-resilient pathway. Gender equality, food security, and clean energy are addressed through a single set of interventions on the ground.

The project had three objectives:



Equip policymakers with the knowledge and capacity to scale sustainable, gender-responsive irrigation solutions



Build women's skills to raise incomes, access employment, and lead as service providers and entrepreneurs in the sector



Document the model's methodology for dissemination across the Hindu Kush Himalaya

WERELIS is funded by the International Development Research Centre (IDRC) and implemented by the International Centre for Integrated Mountain Development (ICIMOD) in partnership with Bhutan's Department of Energy, the Royal Government of Bhutan.

How WERELIS worked

Four commitments shaped how WERELIS worked.

Knowledge, then policy, then practice

WERELIS began by building the evidence – landscape assessments, feasibility frameworks, and digital planning tools – and used it to shape government policy and planning standards. Those standards were then tested in real-world pilot systems on the ground, so what was learned in the field fed back into Bhutan's national irrigation planning.



After receiving basic training on solar system design through WERELIS, we piloted two solar-powered lift irrigation projects. During implementation, we realised we needed guidance to prioritise projects, provide a sound basis for system design, and support discussions with decision makers. This was when the DFS Framework was developed.

Khando Tshering

Principal Engineer, Department of
Infrastructure Development

A feminist, women-centred approach

Women's access and control, agency, and capacity were treated as core measures of success alongside technical and economic outcomes. This was built into every stage, from gender-responsive bylaws in water users associations to guaranteed representation for women on executive committees, and joint financial authority over community funds.

Women farmers as the workforce sustaining agriculture, not its beneficiaries

Bhutan's women farmers already keep agriculture running. Recognising them as the sector's primary workforce rather than its beneficiaries shaped how the project worked. Women were trained as system operators and technicians, seated on decision-making bodies, and supported in building their businesses.

Cross-sector coordination

Institutional collaboration and government ownership were central to the WERELIS approach. Four departments – Energy, Agriculture, Water, and Infrastructure Development – across three ministries came together, through a Project Advisory Committee chaired by the Department of Energy, which developed and validated the project's tools and knowledge products. The committee also brought in private sector representatives.

This process built institutional ownership. The Department of Energy has since adopted the project's knowledge products as official government resources, and the departments involved continue to work together as new sites are developed.

Detailed Feasibility Study (DFS) Framework: Bhutan's first standardised method for assessing whether a proposed irrigation system will work technically, socially, environmentally, and financially. It covers solar, mini-hydro, and hybrid systems. 16 studies were conducted covering more than 3,000 people

Women empowerment framework



CAPACITY

- Knowledge and skills development
- Technical and vocational training
- Economic empowerment and income generation
- Productivity improvement
- Time and drudgery reduction



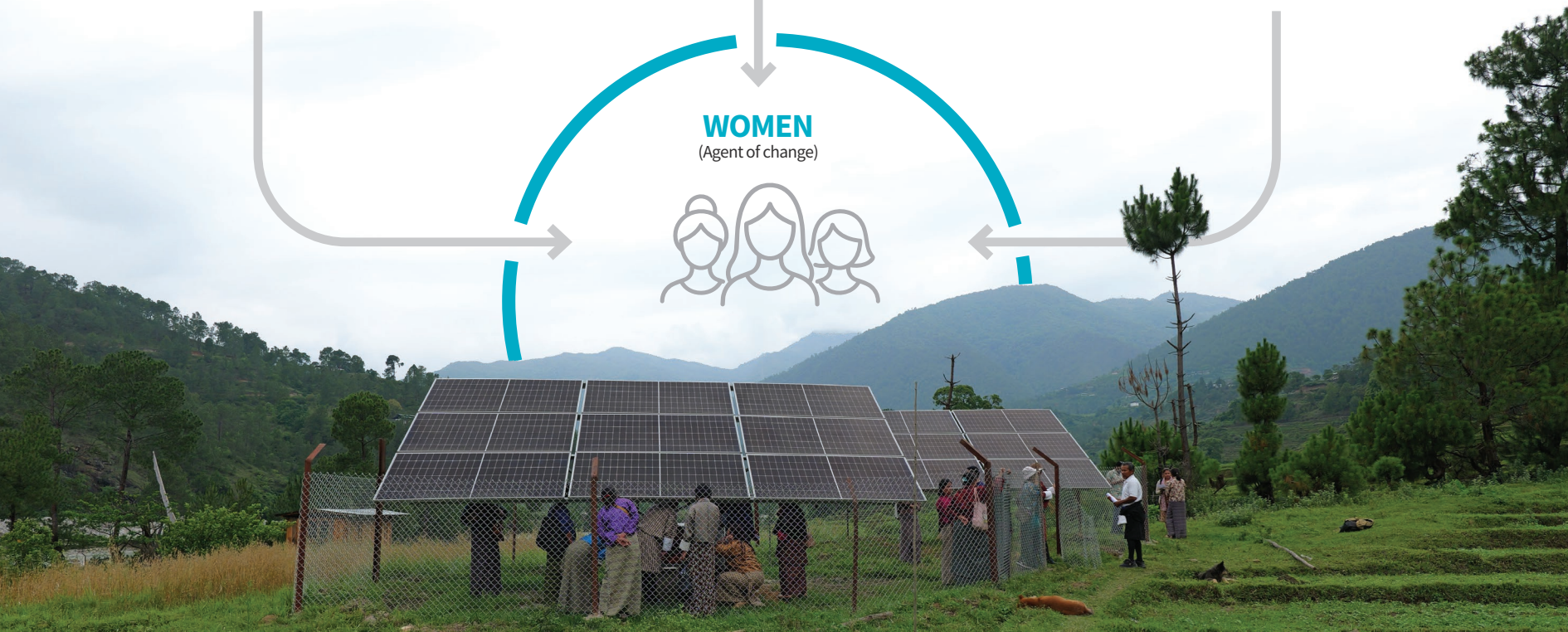
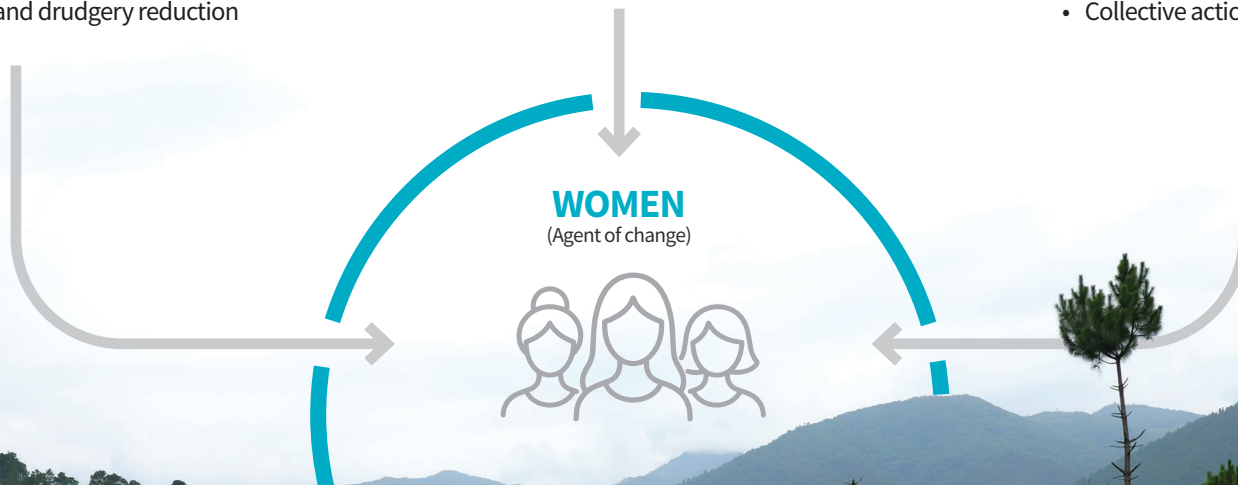
ACCESS AND CONTROL

- Access to technology and information
- Control over resources and assets
- Livelihood opportunities
- Informed decision making



AGENCY

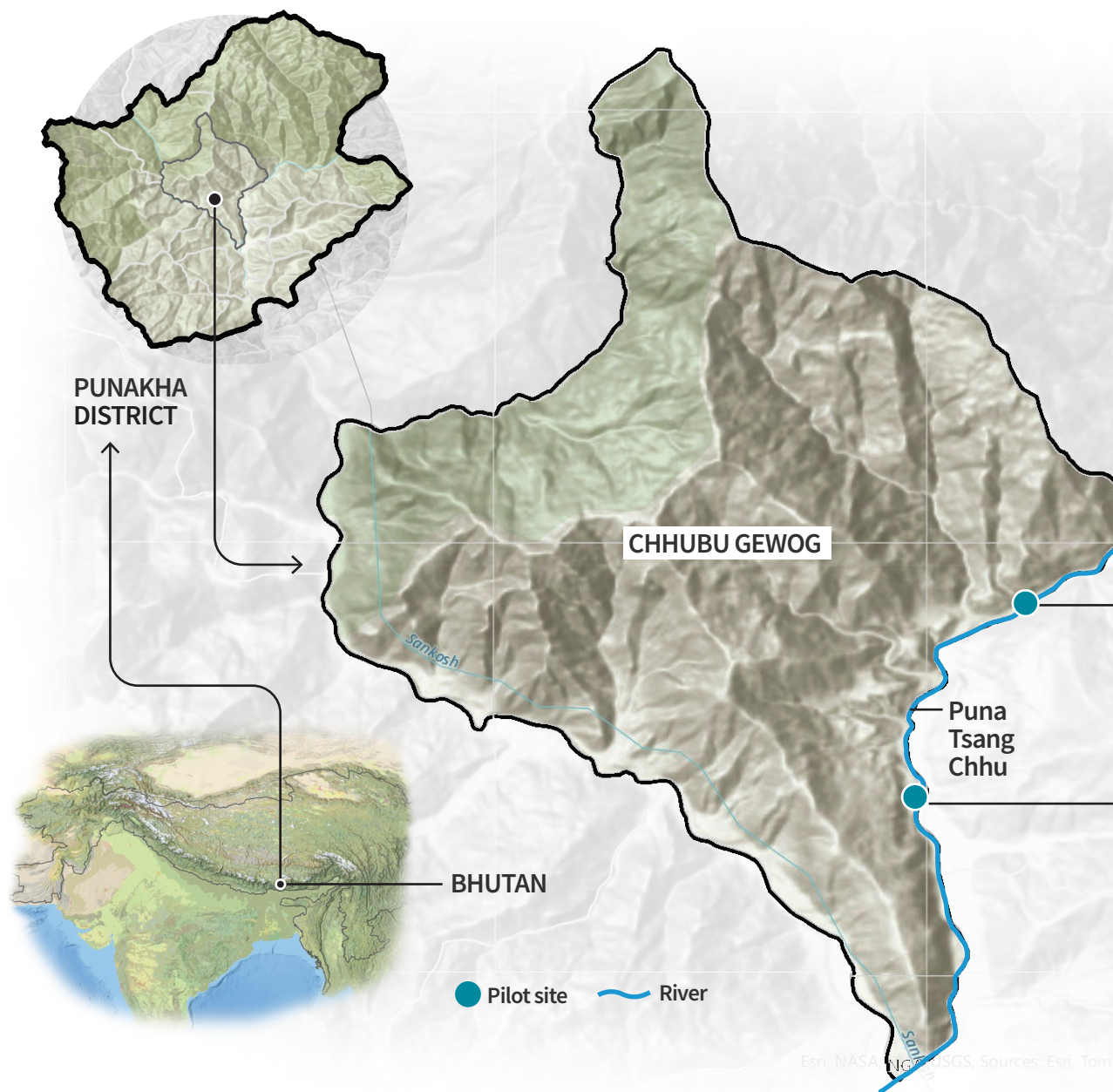
- Participation in decision-making and leadership
- Confidence and self-determination
- Individual empowerment
- Interpersonal empowerment
- Collective action and representation



Where WERELIS worked

The pilot sites lie in Chhubu Gewog, in Punakha Dzongkhag (district), about 70 kilometres north-east of Thimphu. Chhubu sits between mountain slopes and the Pho Chhu and Puna Tsang Chhu rivers, where cultivable land comes in small pockets. The project worked here in two different settings – a community-owned system serving eight households in the village of Tempakha and an individual system built for a single household in Humpathang.

Both sites were identified and validated by project stakeholders as places where women could drive change through RE-powered lift irrigation. Detailed feasibility studies were carried out for sites prioritised by the Royal Government of Bhutan, following rigorous consultation with beneficiaries, local authorities, and relevant agencies. The Multi-Criteria Assessment (MCA) Framework was then applied to compare candidate sites against technical, financial, social, and gender criteria, and identify the sites best suited to implement the lift irrigation systems.



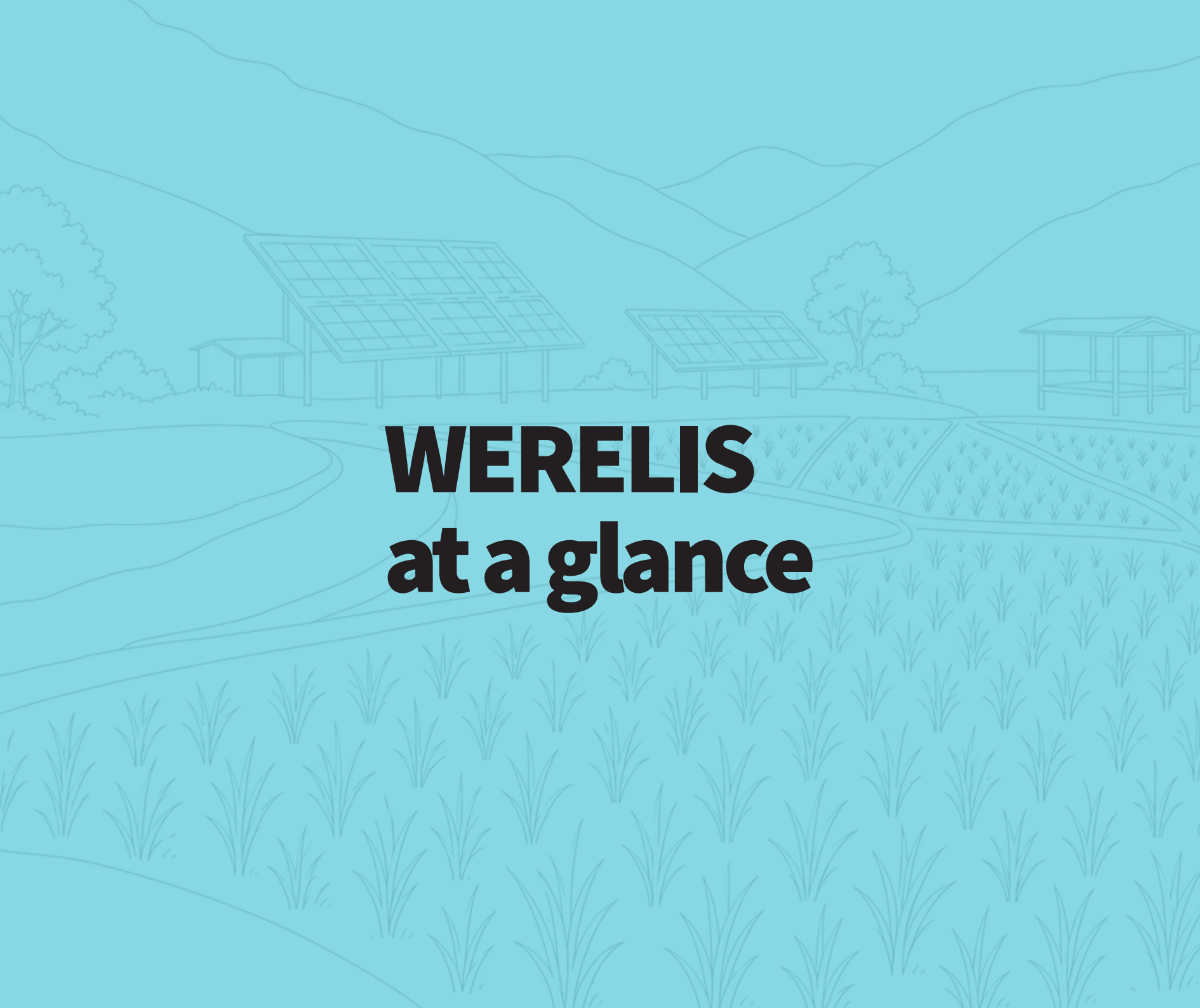


Humpathang site



Tempakha site





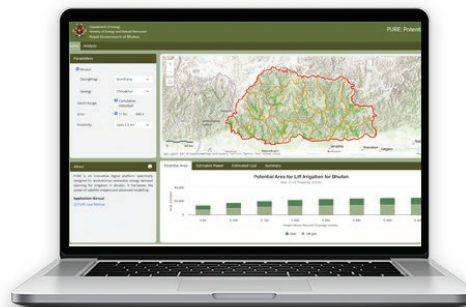
WERELIS **at a glance**

What was built

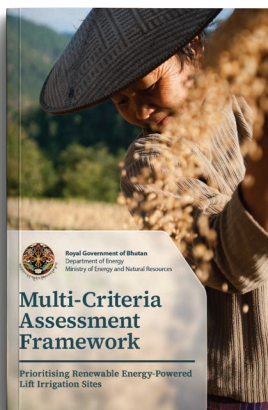
Knowledge endorsed by the government



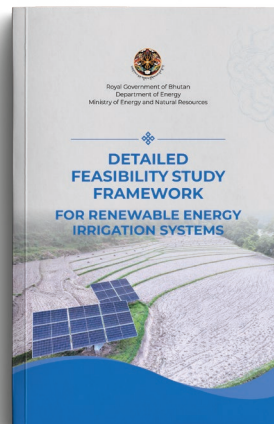
The Landscape Assessment of RE-Powered Lift Irrigation Systems in Bhutan – the country’s first evidence base covering the technical, financial, governance, policy, environmental, and gender dimensions of the sector.



Potential Renewable Energy Demand for Irrigation (PURE) Platform – an online satellite-based decision-support tool that compares irrigation source options and turns technical analysis into implementation-ready decisions.



Multi-Criteria Assessment (MCA) Framework: Prioritising RE-Powered Lift Irrigation Sites in Bhutan – An evidence-based tool for prioritising sites based on technical feasibility, financial and economic viability, social inclusion, and environmental sustainability.



Detailed Feasibility Study (DFS) Framework for RE Irrigation Systems – Bhutan’s first standardised method for assessing whether a proposed RE-powered irrigation system will work technically, socially, environmentally, and financially. 16 feasibility studies conducted covering 1,000 acres of land have identified an estimated USD 1.5 million investment pipeline.

Evidence at scale



**62,400
acres**

mapped for
RE-powered
lift irrigation



**USD 400
million⁷**

(BTN 38 billion)
investment
opportunity



**~68,000 metric
tonnes of CO₂**

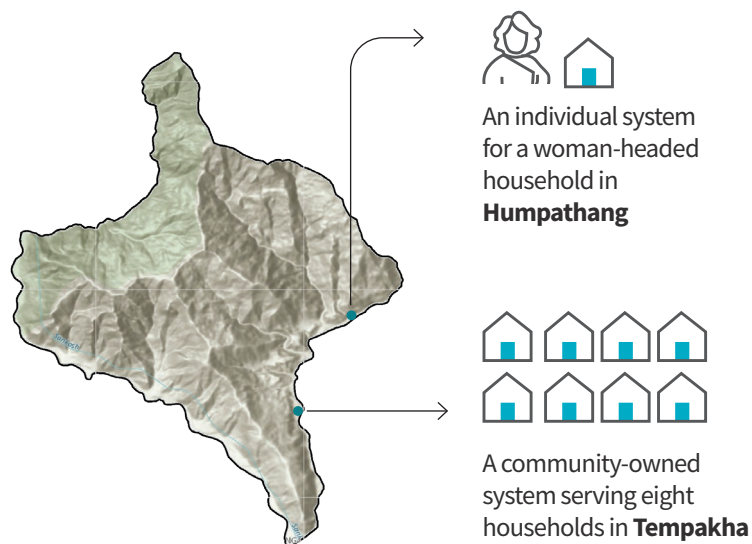
potential annual offset

⁷Department of Energy. (2025). Landscape assessment of renewable energy-powered lift irrigation systems in Bhutan. Ministry of Energy and Natural Resources, Royal Government of Bhutan.

Opportunity for
~14,750
green jobs



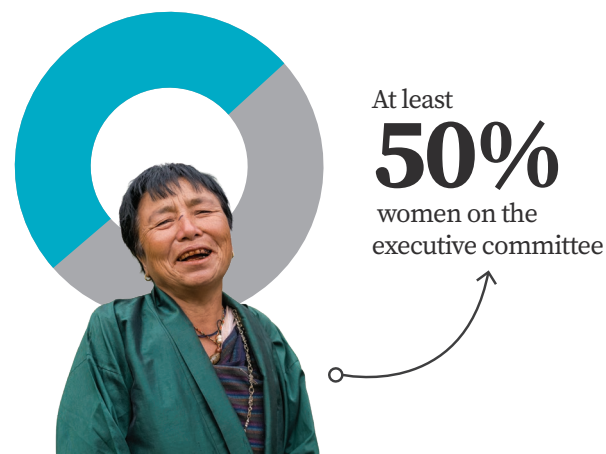
Two ownership models piloted on the ground



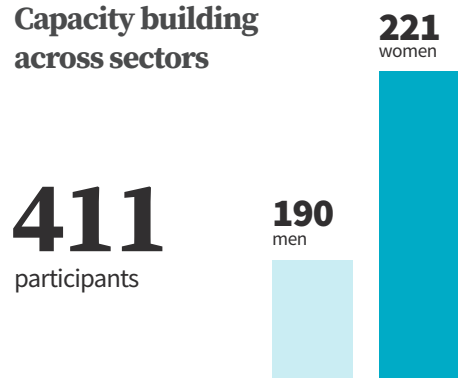
The two models offer a practical comparison for planning future sites.

Governance written for women

The Tempakha Water Users' Association – Bhutan's first built on gender-responsive bylaws, guaranteeing at least 50% women on the executive committee, joint signatory control of maintenance funds with at least one woman, and reduced fees for women and marginalised households.



Capacity building across sectors



Trained across
12
programmes

Representing government, local institutions, farmers, the private sector, universities, and technical institutes.



What changed

Women took on leadership roles

Women hold three of five seats on the Tempakha Water Users' Association executive committee, including the system operator who manages water distribution for the community.

Farming changed

Previously, farmers cultivating summer paddy relied on an 11-day irrigation rotation, meaning they had to wait 11 days to irrigate their land, and spent time digging channels to bring stream water to their fields. With the new system, they have year-round access to water when needed, saving the time and labour previously spent building and maintaining these channels.

Beyond making summertime farming easier, farmers also began cultivating winter crops, such as mustard and wheat, on land that previously produced only one crop or a limited range of crops.

Other farmers who had been cultivating mustard for years also reported higher yields with improved water availability. Khedo and his wife, Kinleymo, harvested 70 kgs of mustard in 2026, compared with around 52 kgs in previous years – a significant 35% increase after the introduction of solar-powered lift irrigation.

Polluting fuels out of the picture

For farmers who once relied on diesel and petrol pumps, irrigation meant recurring fuel costs, occasional breakdowns and the physical work of moving heavy pumps between fields and storage. Surveyed households alone spent between BTN 17,300 and BTN



Now, I just click a button on my phone, and the water starts flowing. We no longer have to carry and set up the heavy pump every time.

Tshering
Humphang



33,700 (approximately between USD 182 and USD 355) on fuel. Solar-powered irrigation is changing that. With water now available without the need for fuel, farmers no longer have to budget for the same recurring fuel expense. They can also avoid many of the disruptions that came with pump breakdowns, including finding technicians and travelling long distances for repairs. The change is physical too. Instead of repeatedly carrying, setting up and dismantling heavy pumps, farmers can access irrigation water through the solar-powered system with far less manual effort – simply by clicking a button on the mobile app.

Private sector opportunities expanded

Dechen Peldon moved from running a supply enterprise to holding a construction license and now bids for government contracts in her own name. With feasibility studies underway for new sites, and the Department of Energy developing further projects, the market continues to grow.

A university changed its curriculum

The Royal University of Bhutan's College of Natural Resources has added a dedicated unit on RE-powered lift irrigation to its BSc Agriculture programme. The change was endorsed by the College Academic Committee in June 2026. Agriculture graduates entering the workforce will now have the technical skills to deploy solar-powered irrigation systems.

RE for irrigation entered national policy

In a letter to ICIMOD, the Department of Energy acknowledged that lessons from WERELIS informed Bhutan's National Energy Policy (2025), particularly its provisions on the productive uses of energy.

The Department of Energy scaled up investment

The project's feasibility studies and tools strengthened the department's technical and decision-making capacity, enabling it to budget BTN 8.9 million (USD 93,859) for RE-powered lift irrigation systems for the first time. Two new community lift irrigation systems in Padhuna in Punakha Dzongkhag and Jorona in Wangdue Phodrang Dzongkhag are now under development.



We already started getting water when the system was partially functional in December 2025. That was when I cultivated mustard for the very first time in my small plot of land (0.125 acres). Before this, I had never imagined growing mustard.

Bidha

Woman farmer,
Tempakha





Powering possibilities

Stories of change across lives,
communities, and systems

PART 1. THE LIVES CHANGED

From farm worker to water manager

Pema Zangmo

System Operator, Tempakha Water Users Association
Tempakha, Chhuhu Gewog



Before the solar-powered irrigation system reached Tempakha, Pema Zangmo and her father trekked to distant mountain streams, carried water on their backs for the family's chilli crop. They spent more than four hours a day irrigating by hand, repeated 20 to 25 times during the growing season.

At 23, Pema has already spent years working on her family farm. She left school shortly after seventh grade to support her family, and lives with her parents in a household of ten.

Farming during the winter and dry seasons was physically demanding. The community's traditional irrigation canal system offered limited relief. Farmers often waited 11 days for their turn, and crops were frequently lost even before harvest.

After WERELIS installed the solar-powered lift irrigation system in May 2026, water began flowing directly to Pema's fields, ending the laborious routine of digging seasonal drains and trekking for hours. Within two months, Pema saw drastic improvements. Her crops were healthier and no longer succumbing to drought. Although the system has been running for only two months, Pema has already noticed improved crop growth and expects yields to increase further as the irrigation season continues.

Beyond the farm, Pema was nominated by her community as the systems operator for the newly formed Tempakha Water Users'



The solar lift irrigation system is not just supportive. It is a gift that will benefit us for many years to come.

Association. Under the association's gender-responsive bylaws, candidates were proposed by the community, discussed in open consultation meetings, and selected by consensus based on reliability and willingness to serve.

At first, she did not see herself as a leader. It was through hands-on training and the responsibility of operating the system herself that her confidence grew. She says she is now confident speaking to people and managing the system on her own. She now manages the daily operation of the system, overseeing water flow and equipment maintenance. Training through WERELIS gave her the practical technical skills to do it, from safely cleaning the solar panels to diagnosing minor faults.

At home, Pema shares decision-making with her family. Her mother chooses what to grow, while Pema has taken on responsibility for



I have to turn off the machine from the controller box before cleaning the solar panels with a wet cloth at sunrise or sunset, which I didn't know before the training.

when and how the farm is irrigated. Within the association, she has developed and manages the water distribution schedule for the community-owned system's eight households, ensuring every farmer receives their allocated share and helping prevent disputes before they start.

With the system now operated remotely through a mobile app, Pema no longer walks two kilometres to the farm just to switch it on or off.



That alone saves her several hours a week. She describes the system as simple to manage from home.

She has even begun suggesting ways to make better use of the surplus water, which currently flows for only about two hours a day and is used mainly to supply livestock. She now speaks openly at association meetings, something she would not have done a year ago.

PART 1. THE LIVES CHANGED

Running it herself

Tshering Pem

Farmer and System Operator
Humpathang, Chhubu Gewog

Tshering Pem is the single head of her household. For nearly a decade, that has meant hauling a petrol pump to the river and back to irrigate her four acres and keep it running by herself.

She has used a petrol-powered pump to irrigate her field since 2015 and replaced it three times. One was washed away in heavy rain, and one broke down after sand got into the motor.

Her third pump, bought in 2024, cost BTN 28,000 (USD 295). Running it for one rice season takes about 120 hours and 162 litres of petrol, a fuel bill of BTN 16,362 (USD 172) before she has even grown a single crop.

The pump weighs 25 to 30 kilograms and carrying and setting it up take 40 to 60 minutes each time. Sand drawn up with the water is slowly making her soil sandier. When the pump breaks, the nearest technician is in Khuruthang or Lobesa, 25 to 32 kilometres away. Getting there means hiring a vehicle for around BTN 2,000 (USD 21), and a 1.5-hour drive on a rough farm road, and repairs usually take three days. Even routine use is heavy work. The pump lets her irrigate her fields whenever she needs to, but everything else about it works against her.



There are no men in my household, so I am responsible for operating and maintaining the solar-powered lift irrigation system. This training helped me understand how to maintain the system for long-term use and the safety measures I should follow during operation.

In Humpathang, WERELIS installed a solar-powered lift irrigation system in June 2026 for her household – the only individual system among the two pilots. Now, there is no need to buy fuel and carry a pump back and forth. Tshering Pem was trained to operate and maintain it herself.



Tsering Pem shares updates on the lift irrigation project through her TikTok account.



I can now share this knowledge with others in the community by raising awareness about the safe operation and proper maintenance of the solar-powered lift irrigation system.



PART 1. THE LIVES CHANGED

A harvest of possibilities

Kinley Dem

Farmer, Jongkholo Village, Chhubu Gewog



For 55-year-old Kinley Dem, farming was always defined by the limits of water. She lives with her elderly husband, her son, and three other family members, but only she and her son work on the family's three-acre farm.

Her paddy fields sit at the tail end of the irrigation command area,⁸ where water distribution was often inadequate and unreliable. She spent considerable time maintaining irrigation channels to bring water to her fields, and inconsistent supply affected crop yields and limited vegetable cultivation. Water availability decided what crops she planted.

When the WERELIS solar lift-irrigation system first became partially available, Kinley noticed her paddy crop growing healthier. The following year, with full access to the system, she irrigated her fields reliably for the first time.



If the system performs as expected, I may no longer have to travel such long distances to secure water for irrigation. I may be able to farm according to my own plans and schedule without having to wait for water.



In the past, women depended on men to repair water sources, but now they do not have to depend on them as much. Women can manage the solar system and irrigation more independently.

Reliable irrigation has let Kinley think beyond a single crop. She plans to grow vegetables, wheat, and mustard alongside rice, making decisions based on market opportunity and household needs rather than uncertainty.

Kinley also took part in the WERELIS training on agricultural entrepreneurship and on the operation and maintenance of the irrigation system. She now encourages neighbouring communities to submit proposals to the gewog administration for similar irrigation projects. As a member of the Tempakha Water Users' Association, she helps manage the system and speaks with other farmers about how reliable irrigation can improve farming and lighten the load on women.

⁸ Irrigation command area is the total land area that can be irrigated by a given irrigation project or canal system. ⁴ National Commission for Women and Children. (2019).



Kinley is also clear about who gets trained.



When only men attend training, they do not always share what they have learned. Women usually do, and the men in our community have been supportive of women taking part in these opportunities.



PART 1. THE LIVES CHANGED

Carrying less, growing more

Khedo

Chair, Tempakha Water Users' Association
Chhubu Gewog, Punakha



For three years, Khedo carried a 50-kilogram irrigation pump and 12 litres of diesel down to the Puna Tsang Chhu river, where the Pho Chhu and Mo Chhu rivers meet below Punakha, and back up to his farm. Each trip cost roughly BTN 1,000 (USD 10.5). He travelled a further 15 kilometres to Khuruthang in Punakha, just to buy the fuel.

Khedo lives with his wife on a 1.7-acre farm in Chhubu Gewog. Farming has always been their main source of income, but without reliable irrigation, growing anything was a struggle. Their irrigation source lay about 11 kilometres away, and water was distributed on an 11-day rotation. If the source dried up or a problem arose upstream, they waited for the next cycle. With water that scarce, they could only grow a single paddy crop during the summer. When it rained, they would hire a power tiller immediately and transplant seedlings before the soil dried out. Even then, one harvest was rarely enough to support the household.

To cope, Khedo borrowed money for a diesel pump. The pump was too heavy for his wife to carry, so the work usually fell on him or required help from relatives. He even built a small shed by the river to store the pump between uses. Even so, the cost of fuel, transport, and maintenance placed a constant strain on the family's finances.

In 2025, WERELIS installed a solar-powered lift irrigation system in the community. Transporting materials and heavy equipment to the site was difficult, but Khedo was determined to see it through. Since the system was installed, he has not needed the diesel pump or the trips to Khuruthang. His wife suggested keeping the old pump as a backup. It sits unused.



The change has been especially important for the women in our community, especially those whose husbands are away or unable to help. They no longer have to struggle with heavy machinery and can access water much more easily.



Reliable irrigation has also improved his harvest.



This year, I harvested 70 kilograms of mustard from the same plot where I used to harvest around 52 kilograms because I now have better access to irrigation.

Chairing the water users' association

Khedo now serves as chairperson of the Tempakha Water Users' Association, which manages the irrigation system for eight households, six of them led by women. Together, the group has built a simple way for running the scheme. Each member contributes



BTN 1,000 to open a joint account, and an annual maintenance fee of BTN 500 is collected. Financial records are shared during meetings, which helps maintain trust.

For Khedo, the solar lift irrigation system has cut the physical and financial burden of irrigation, making farming more reliable. It has also created something the community did not have before: a way of managing water together and a route for the women of Tempakha to manage their farms without waiting for someone else to lift the pump.



PART 2. COMMUNITIES TAKING OWNERSHIP

The Tempakha Water Users' Association

In 2026, the WERELIS project supported the formation of the Tempakha Water Users' Association. It was registered with the Chhubu Gewog administration and constituted in line with Bhutan's national guidelines, with one key difference – it was founded on gender-responsive bylaws that make women's voices central to the governance of water, energy, and agriculture.

For farmers in Tempakha, the association was more than just paperwork. It gave them a community institution, ownership of the solar lift irrigation system, and a platform to manage it collectively. Its five-member executive committee includes three women in key positions.

The bylaws embed fairness and equity into the association's foundations:

Equal representation: At least 50% of the executive committee must be women, guaranteeing their participation in decision-making.

Shared financial authority: The maintenance fund has joint signatories, the Chairperson and the Treasurer, with the provision that one of the two must be a woman.

Accessible membership: Women, household heads with disabilities, and members of marginalised groups receive a 50% concession on membership fees.



Advisory inclusion: A three-member advisory committee, which must include at least one woman, ensures women's concerns are raised at every level.

Transparent participation: Meetings should be announced in advance (three days for committee sessions and four days for annual meetings) so that members with household responsibilities, most of whom are women, can plan to attend.

PART 2. COMMUNITIES TAKING OWNERSHIP

When communities take ownership

Tshering Lhamo

Agriculture Extension Officer
Chhubu Gewog, Punakha



Tshering Lhamo has spent 22 years in Bhutan's civil service, more than seven of them as the Agriculture Extension Officer in Chhubu Gewog. She has witnessed up close what unreliable irrigation does to farming households.

Before the solar lift irrigation system was introduced, farmers depended on traditional irrigation sources such as gravity-fed systems and often waited for around 11 days for their turn. These long intervals disrupted planting schedules, reduced crop production, and left large areas of farmland uncultivated.



In the past, farmers could not always cultivate their paddy fields on time because of water shortages. Even after planting, the fields often dried up when there was little rainfall, reducing yields. With reliable irrigation, they will be able to grow crops on time, increase production, and improve their incomes.

Construction of the solar lift irrigation system began in June 2025 and was completed in May and June 2026. Because the system has only recently become fully operational, Tshering Lhamo says it is too early to measure its impact on agricultural production. The current paddy transplantation season will be the first in which farmers use water supplied by the new system, but she is confident.

Looking ahead, she expects the improved water supply to bring more fallow land back into cultivation. Water shortages had prevented many farmers from cultivating all their land or following planned cropping schedules. Reliable irrigation will let them make full use of their farmland.

She has also observed the burden on women shift. Previously, when irrigation channels were damaged or water shortages hit during cultivation season, men were usually responsible for repair work. With the solar irrigation system, women are managing irrigation without relying as heavily on male family members.

Through WERELIS, women from the community attended training programmes in Lobesa and at the gewog. For many, it was the first formal training of their lives.



Ownership in practice

The Tempakha Water Users Association, together with the local government, is responsible for managing and maintaining the infrastructure. Operators have been trained in routine maintenance, and members are encouraged to take collective responsibility for protecting the system and arranging repairs.

Tshering Lhamo has seen the project strengthen cooperation and disputes now have a clear path:

Farmers' understanding of the technology has grown as well. At the beginning of the project, many people questioned how the system worked, what it cost, and whether it would function on cloudy days. Consultations, demonstrations, and testing gave them a clearer picture of both the system's benefits and the limitations.

Reflecting on implementation, she believes early community engagement was essential. Projects cannot reach every village at once, and being clear about how sites were selected built trust and kept expectations grounded.



If there is any dispute or problem, community members first try to resolve it among themselves. If they cannot find a solution, they come to me. If it still cannot be resolved, it goes to local government leaders such as the Gup⁹ and Mangmi¹⁰.

⁹ The elected head of a gewog.

¹⁰ The elected deputy head of gewog.

PART 3. OPPORTUNITIES BEYOND THE FARM

Bidding in her own name

Dechen Peldon

Founder, Dechen Enterprise
Thimphu



Dechen Peldon is neither an engineer nor a certified technician. But she has designed swimming pools and hot water systems for hotels across Bhutan, and complex irrigation wells, entirely through field experience, self-learning, and determination.

A graduate of business administration and a former civil servant, she never expected to become a technical contractor supplying RE equipment such as energy-efficient heat pump systems. Encouraged by her husband, she founded Dechen Enterprise in December 2018.

Over the following years, Dechen completed eight RE projects across Bhutan. But despite delivering complex mechanical and civil projects, her work received little formal recognition because she did not hold a construction license. As the owner of a supply enterprise, she depended entirely on other companies to bid for government tenders, issued exclusively under the construction category. She could not compete independently for higher-value contracts, limiting opportunities for her business to grow.

Through WERELIS, Dechen received hands-on technical mentoring on pilot installations, which strengthened her portfolio and supported her application for a construction license. She is now a

licensed construction entrepreneur and one of Bhutan's pioneers in surface and submersible pumping systems.

The experience also transformed how she works. The installation that once took her several months in the early stages of learning, she now delivers in as little as three weeks. That experience also helped her win her current projects: new solar lift irrigation systems in Padhuna and Jorona, where the Department of Energy is now replicating the WERELIS model. Holding her own construction license has allowed her to bid for government tenders and take on contracts in her own name for the first time. She now uses mobile technology to remotely monitor water flow and system performance, reviewing real-time data to identify maintenance needs and act before farmers are affected.



I am more confident in these technologies now.



If we don't understand, we Google it. We research it, and we do it in the practically field.

Dechen treats every problem as something to be learned rather than avoided. She believes Bhutan needs far more local technical experts in solar-powered lift irrigation, and that successful systems must be designed to suit local conditions they will actually operate in rather than relying on a one-size-fits-all solution.



PART 4. CHANGING SYSTEMS, BEYOND THE PUMP

Rewriting the curriculum

Tulsi Gurung

Associate Professor,
College of Natural Resources,
Royal University of Bhutan



More than a decade ago, a village leader told Tulsi Gurung:



Don't just tell us to plant trees at the water source. Find a way to bring the water from down below up to our fields.

At the time, there was no practical answer to give him.

Tulsi works at the intersection of research, education, and rural development. Before joining WERELIS, she had identified a gap. Water scarcity was becoming an increasing challenge for farmers, particularly amid changing climatic conditions, yet the university's agricultural curriculum offered little exposure to RE-powered irrigation technologies. Graduates and district-level staff were entering the field without the knowledge to support these systems. The Landscape Assessment would later confirm this, identifying a shortage of trained professionals capable of designing and implementing the systems.

Through WERELIS, Tulsi and her team generated evidence that made the case for curriculum reform.

The findings identified irrigation water scarcity as a priority challenge for rural communities, providing a strong basis for introducing a dedicated unit on RE-powered irrigation within the Irrigation Water Management module of the BSc Agriculture programme. It is a core component of the module, with its own learning outcomes and assignments. The College Academic Committee endorsed it on 5 June 2026, and it is being taught. Students now receive formal instruction on the principles, design, and application of solar-powered irrigation systems.



Our team's involvement in the baseline survey, landscape assessment, and feasibility studies became powerful evidence for us to convince the academic committee.



Working with technical experts from the Department of Energy, she deliberately defined the unit's scope. Rather than detailed engineering, it emphasises practical field skills, such as site selection, field surveys, source-to-command-area measurements, and use of the PURE platform. Advanced engineering topics will be covered through future collaboration with the College of Science and Technology.

The approach changed how students learn. Instead of classroom instruction alone, Tulsi now uses the WERELIS pilot sites as field laboratories, where students observe operational systems and speak directly with the farmers who run them.



We now know many of the farmers, which makes teaching much easier.

Beyond the degree programme, short-course training materials on solar-powered lift irrigation have been developed for extension workers and field technicians, with plans to co-host the course with the College of Science and Technology.

Recognising that women in rural Bhutan often carry the primary responsibility for irrigation and vegetable production, Tulsi Gurung built gender-responsive approaches into the curriculum. The unit highlights the role of inclusive water users' associations and asks students to consider gender and social inclusion when planning irrigation interventions. With more women enrolling in agriculture programmes each year, she sees an opportunity to prepare a generation of women technical professionals and leaders for the RE sector.

She now plans to supervise undergraduate and postgraduate research on the feasibility of these irrigation systems and to develop proposals to extend them to remote mountain communities, including those that support yak herders.

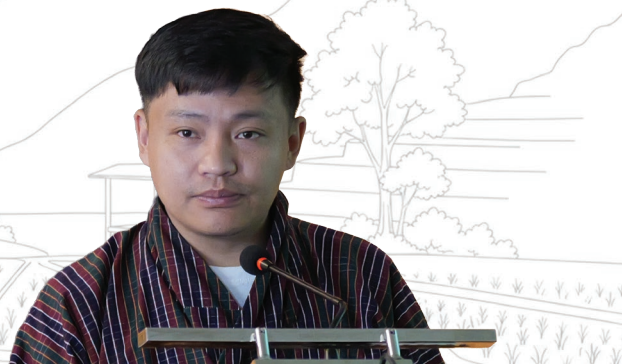
The village leader's question now has an answer.

PART 4. CHANGING SYSTEMS, BEYOND THE PUMP

From knowledge to pilots and practice

Rigzin Pelzang

Engineer
Department of Energy



Rigzin plans, implements, monitors, and evaluates RE systems for Bhutan's Department of Energy, particularly solar photovoltaic technologies. His work across Bhutan spans rooftop solar, solar-powered lift irrigation, rural electrification, and battery energy storage, while coordinating across government agencies, development partners, contractors, and utilities.

Since WERELIS began, Rigzin has helped develop four of the project's core knowledge products: the DFS Framework, the MCA Framework, the Landscape Assessment of RE-powered Lift Irrigation in Bhutan, and the PURE platform. He sees them as practical, evidence-based guidance for policymakers, engineers, and local governments planning these systems, and as reference materials for universities, technical institutions, and RE professionals.

The project's focus on gender equality and social inclusion changed how he approaches his own work. He now factors in social inclusion during project planning and implementation, with a clearer understanding of how RE projects can better serve women, vulnerable groups, and remote communities.



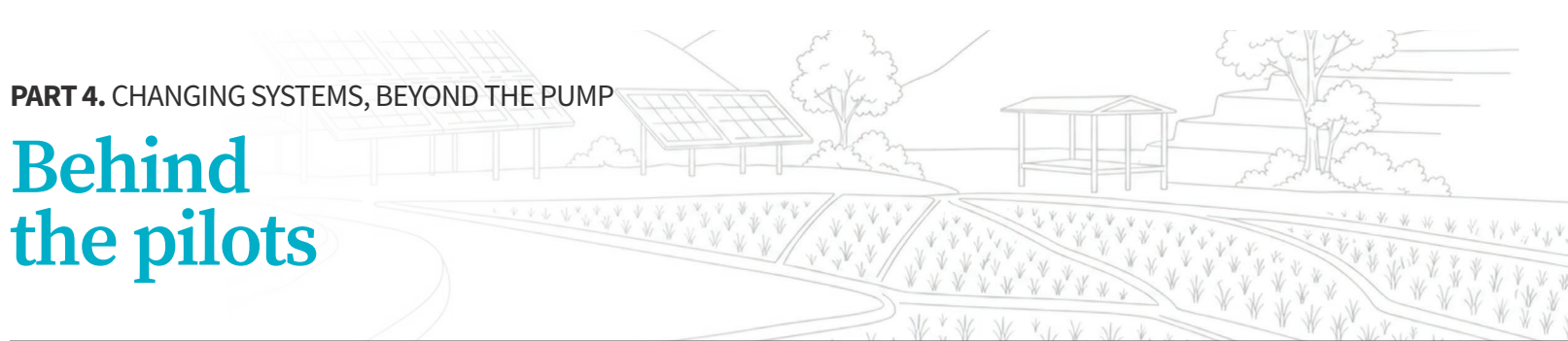
Capacity building is one of the project's greatest strengths. For me, the real value has been learning by doing—working on the ground, troubleshooting challenges and putting new knowledge into practice. Through field implementation, technical trainings and workshops, I have deepened my understanding of solar water-pumping system design, operation and maintenance, while also gaining valuable skills in project planning, stakeholder coordination, monitoring and risk management.”



The Department of Energy itself works differently now. It is better equipped to evaluate RE-powered water pumping technologies, review technical designs, and weigh technical, financial, environmental, and social considerations in project planning.

Scaling up RE-powered irrigation, he argues, will require three things: farmers directly involved in planning and management, private-sector innovation and local entrepreneurship, and policies and financing mechanisms that build gender equality and social inclusion into RE programmes from the start.





PART 4. CHANGING SYSTEMS, BEYOND THE PUMP

Behind the pilots

More than 400 people were trained, from national policymakers to farmers, including a new national pool of trainers who can now teach the DFS Framework themselves.



As this is a Training of Trainers programme, I feel it is my responsibility to share the knowledge I have gained. I plan to train both my current and future colleagues, so they can also apply the DFS Framework in their work.

Dawa Zam

Executive Engineer,
Department of Energy

At the community level, 19 of the 23 farmers trained were women. They learned to perform routine system maintenance and fix minor faults themselves rather than calling a technician.



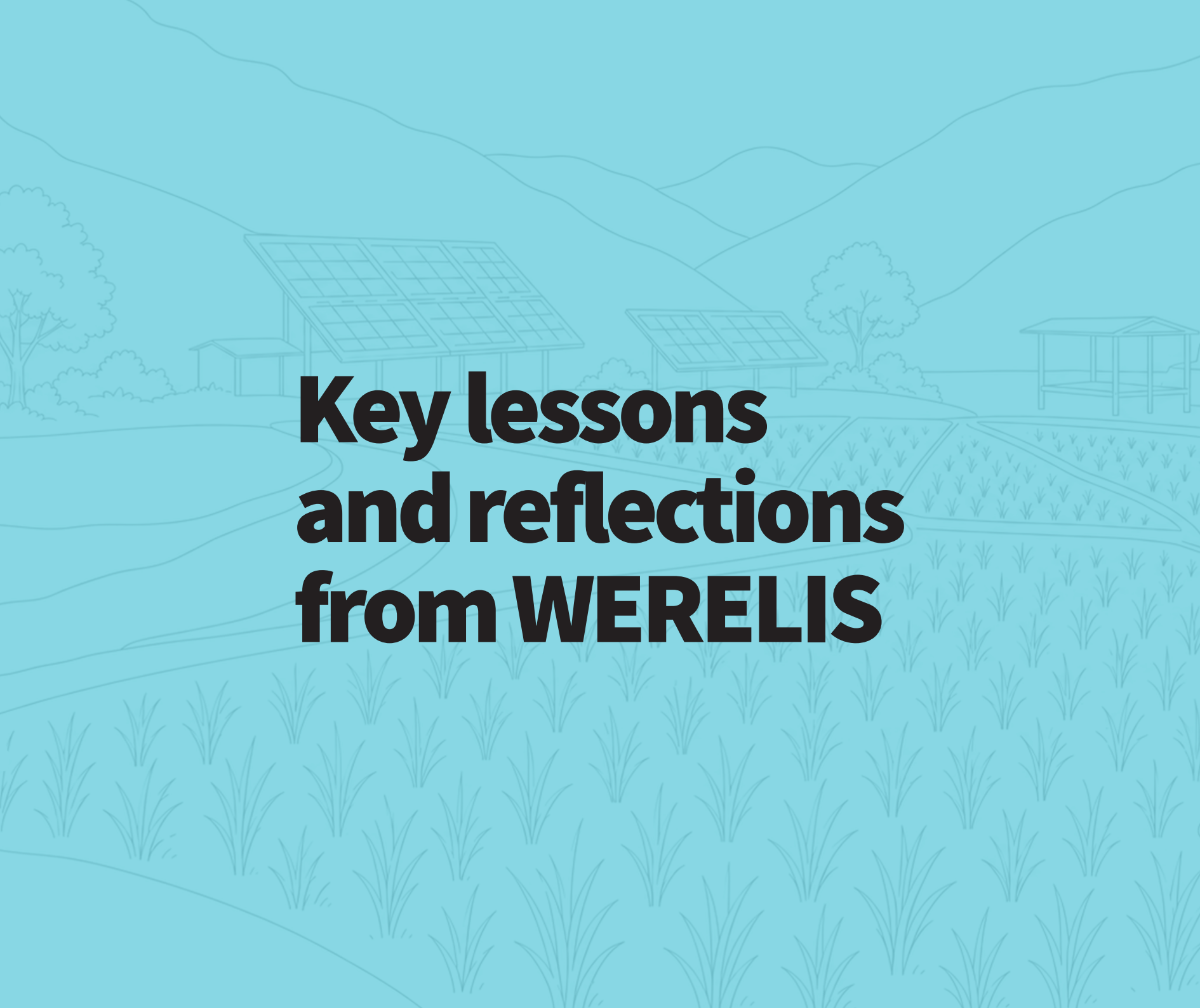
If I had not attended the training, I would have called a technician to fix even minor problems. Now I know many basic maintenance tasks can be carried out locally, which saves both time and effort.

Dorji Khandu

Mangmi, Chhubu Gewog

In Chhubu and Barp gewogs, 241 women completed a course on running a farm as a business, covering topics from financial literacy and crop planning to cost-benefit analysis. Barp lies outside the pilot area, so the training reached women beyond the two villages where the systems were built. For many, it was their first exposure to entrepreneurship and the first time they considered themselves capable of leading not just farms, but businesses.

Further details are in the Annexe.



Key lessons and reflections from WERELIS

Design around the user, not the technology

Every design choice started with the women farmers themselves, their aspirations, daily challenges, and circumstances, and built the technology around these needs rather than the other way around. Women's participation was embedded in both the training and decision-making, shifting them from users of irrigation systems to operators, managers, and leaders.



The technology should serve the community, not the other way around. Sustainability must be embedded as much in governance and community empowerment as it is in infrastructure.

Karma Penjor Dorji

Director General, Department of Energy, Ministry of Energy and Natural Resources, Bhutan.



Engage all relevant institutions from day one

Rather than developing a technology or framework and then seeking government endorsement, the project involved relevant agencies from the outset and throughout implementation. The Project Advisory Committee was formed in the project's first month, bringing together the Departments of Energy, Agriculture, Water, and Infrastructure Development, as well as private-sector representatives. Government partners were directly involved in site identification, site surveys, community consultations, assessment tools development, hardware implementation and monitoring, capacity building, and the future project pipeline.

Their inputs shaped the project as it developed and gave them a stake in its success. It built confidence in the technology, approach, and implementation because government counterparts had helped generate the evidence and test the systems themselves. It also strengthened institutional capacity, making the tools, processes, and pipeline easier to carry forward once the project ended.

Government engagement should not be limited to consultation or approval. Embedded across the full project cycle, it builds ownership, capacity, and pathways to scale from the beginning.



Every agency has its own mandate, policy, and planning framework. The biggest challenge is the fragmentation of responsibilities and accountability. More often than not, this leads to bottlenecks in implementation. The Project Advisory Committee is a critical mechanism that can bridge these institutional silos.

Karma Penjor Dorji

Director General, Department of Energy, Ministry of Energy and Natural Resources, Bhutan.

Build the ecosystem, not just the technology

Energy transitions are rarely constrained by technology alone. Technology creates the opportunity, while policy, finance, institutions, markets, and local capacity determine whether it can be sustained and scaled. For RE-powered irrigation, this means community ownership, inclusive governance, technical skills, institutional coordination, and private-sector capacity.

WERELIS connected farmers, government, academia, and the private sector, trained more than 400 people, and strengthened local capacity to operate and maintain systems. It also demonstrated the value of linking irrigation with gender equality, food security, climate resilience, and clean energy.

The project went beyond piloting solar-powered lift irrigation. It mapped 62,400 acres of irrigation potential, identified the key barriers to scale, developed practical tools to guide projects from pre-feasibility through design, decision-making, implementation, and operation, and built a pipeline for future investment.

Pilot what can be replicated

Successful scale-up requires more than replicating the technology. The pilots tested different ownership models, planning approaches, and governance arrangements, generating practical lessons for adapting RE-powered irrigation to diverse local contexts.

Standardised tools and evidence-based planning matter here. The Landscape Assessment, PURE platform, DFS Framework, and MCA Framework provide a systematic basis for identifying, assessing, and prioritising sites, and have been adopted by the Department of Energy as official resources. This has helped move the approach from isolated pilots towards wider institutional uptake.

Replication is already under way, with the Department of Energy allocating BTN 8.9 million (USD 93,859) and initiating systems in Padhuna and Jorona. What can be scaled is not a fixed technical model, but a flexible package of technology, evidence, local capacity, and inclusive governance that can be adapted to different communities across Bhutan and the wider Hindu Kush Himalaya.





The background is a light blue monochrome line-art illustration. It depicts a rural landscape. In the foreground, there is a field of stylized grass or crops. A winding river or path flows through the middle ground. On the left bank of the river, there are two large solar panels mounted on stands. To the right of the river, there is a small structure that looks like a covered walkway or a small house. In the background, there are rolling hills or mountains. The overall style is clean and modern, with a focus on sustainable energy and rural development.

Way forward



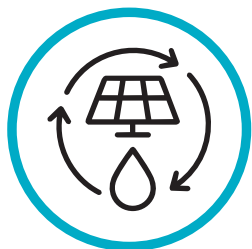
WERELIS did not simply demonstrate that RE-powered irrigation works in Bhutan. It built the knowledge, tools, standards, governance models, and trained people needed to keep building these systems. Practical tools and institutional practices now sit within government systems, universities, and communities, where they can continue to support innovation long after the project closes.

Bhutan has already begun to use them. Productive use of RE is addressed in the National Energy Policy. The Department of Energy has budgeted its own funds for further installations. The Royal University of Bhutan is preparing the next generation of agriculture professionals.

The scale ahead remains considerable. The PURE platform has mapped 62,400 acres with potential for RE-powered lift irrigation, representing a substantial investment opportunity. Behind that figure are thousands of women farmers still carrying water, still waiting for their turn for irrigation, and still relying on diesel.

The next challenge is to turn this experience into a coordinated national effort to scale up RE-powered irrigation, linking energy and water investments to agricultural productivity, women's livelihoods, and food security. Reliable, clean energy-powered irrigation can help Bhutan's farmers prosper. Realising that potential will require the same coordinated, farmer-centred approach that has guided this work from the start.

The focus should now be on:



- 1** Establishing a national multi-year programme for solar-powered lift irrigation, with coordinated engagement across energy, agriculture, water, infrastructure, and local government, so that irrigation investments ultimately translate into higher agricultural productivity, incomes, and food security



- 4** Building a strong private-sector delivery and service ecosystem for technology supply, installation, operation, maintenance, and after-sales support



- 2** Developing a national investment and implementation pipeline, using the tools and approaches already developed, and planning phased scale-up



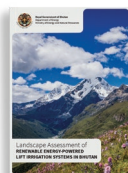
- 5** Creating an integrated monitoring framework that tracks not only system performance and irrigated area, but outcomes that matter: productivity, cropping intensity, farmer incomes, women's labour savings, and climate benefits



- 3** Mobilising large-scale public capital as the anchor investment, and using it strategically to leverage concessional climate finance, development finance, commercial lending, and private sector participation

Resources

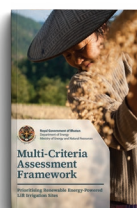
Knowledge products developed through WERELIS



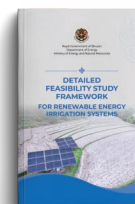
**Landscape Assessment of
RE-Powered Lift Irrigation
Systems in Bhutan**



The PURE Platform



**Multi-Criteria
Assessment (MCA) Framework**



**Detailed Feasibility
Study (DFS) Framework**



Annexe

Project team

International Centre for Integrated Mountain Development (ICIMOD)

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Department of Energy, Ministry of Energy and Natural Resources

Karma Penjor Dorji

Director General

Dawa Zangmo

Chief Engineer

Dechen Dema

Executive Engineer

Rigzin Pelzang

Engineer

Bhutan Ecological Society

Nawang Norbu

Executive Director, Bhutan Ecological Society

Namgay Dendup

Nature-based Solution Specialist

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Karma Penjor Dorji (PAC Chair)

Director General, Department of Energy, Ministry of Energy and Natural Resources

Khando Tshering

Principal Engineer, Department of Infrastructure Development, Ministry of Infrastructure and Transport

Kinzang Namgay

Deputy Chief Forest Officer, Department of Water, Ministry of Energy and Natural Resources

Tenzin Drugyel

National Focal Point for Irrigation, Department of Agriculture, Ministry of Agriculture and Livestock

Yeshey Chen Chen Lham

Director, Research and Strategy, Bhutan Chamber of Commerce & Industry

PURE platform training (2025): 39 policymakers and private sector leaders attended, 44% of them women, and learned to use the PURE platform for macro-level mapping, energy demand estimation, grid and river overlays, dzongkhag and gewog-level site identification. For many, it was their first time seeing digital tools applied directly to energy, irrigation, and agricultural planning.

Operation and maintenance training for stakeholders (in-person and online, 2025): Two one-day training programmes on the operation and maintenance of solar-powered lift irrigation systems for representatives from technical training institutes, the private sector, academic institutions, and government agencies. The training focused on operating solar water pumping systems, operators' roles and responsibilities, preventive maintenance, and basic troubleshooting. A total of 124 participants attended, 55 of them women. Before the training, almost all participants reported little or no confidence in operating solar-powered irrigation systems. Afterwards, more than three-quarters felt confident enough to operate the systems.

Design of RE-powered lift irrigation system training (in-person and online, 2025): Two two-day programmes, one in person and one online, covered the fundamentals of solar-powered lift irrigation, including system design, operating principles, and the sizing of key system components. The 110 participants included 33 women, primarily engineers from government agencies supporting local administrations, as well as students. Self-assessed confidence in conducting technical site surveys and designing solar lift irrigation systems rose from 3.35 to 7.5 out of 10 among in-person participants and from 3.98 to 6.4 out of 10 among online participants.

Women entrepreneurial leadership programme (2025): A two-day programme, 'Entrepreneurial Leadership for Women Farmers: Maximising Benefits from RE-powered Irrigation', was held at the College of Natural Resources, in collaboration with the college, the Bhutan Ecological Society, and ICIMOD. It brought together 21

women farmers, among them one agriculture extension officer from Chhubu and Barp gewogs in Punakha. The training covered agribusiness and ecosystem management, financial literacy, crop calendars and planning, crop selection and cost-benefit analysis, and the Lean Canvas business model. Participants were keen to apply the tools on their own farms and to share the knowledge with family and community members.

Training of trainers (ToT) on the DFS Framework

(2026): 30 participants, more than 44% of them women, from the water, infrastructure, energy, agriculture departments, Electricity Regulatory Authority, private firms, civil society organisations, and ICIMOD. The training equipped them with the knowledge and skills to apply the framework and cascade it within their respective institutions, establishing a pool of national trainers and ensuring consistent application across Bhutan.



The DFS Framework serves as a critical tool for evaluating new project proposals submitted to our department. It enables us to make informed decisions by assessing the technical, financial, and overall sustainability of a project, improving the quality of our decisions and saving time and resources.

Tenzing

Department of Agriculture

Exposure visits (2026): One of the two exposure visits to the pilot site in Tempakha gave gewog women leaders the chance to observe how a solar lift irrigation system works, interact with farmers and project stakeholders, and assess how similar systems might work in their own gewogs. 37 women leaders took part in this. The other exposure visit targeted 27 women farmers from six non-pilot gewogs within Punakha Dzongkhag, local Chhuba and Guma gewog leaders, and an agriculture extension officer to the pilot solar lift irrigation site at Humpathang. The women farmers gained conceptual understanding of solar-powered lift irrigation systems.

Operation and maintenance training for farmers

(2026): At the community level, WERELIS trained farmers from Guma and Chhubu gewogs, where the Department of Energy is developing new community lift irrigation systems. Of the 24 farmers trained, 18 were women. The session combined theoretical orientation with hands-on demonstration at the solar site: clean solar panels, checking cable conditions, and recognising and fixing minor faults themselves rather than calling a technician. In the words of one participant, “the unfamiliar system has become a symbol of empowerment run and maintained by the very women whose lives it changes.”

Outreach and dissemination of project findings

(international and regional): The project shared its findings through regional and international platforms, including the Southern African Development Community (SADC) Energy Week 2025 in Botswana, the Asia-Pacific Forum for Sustainable Development (APFSD) 2025, Asia Pacific Energy Week 2025 (ESCAP) in Bangkok, and a regional cross-learning event in China. ICIMOD was invited as a speaker and panellist at these key regional and global platforms. At SADC, ICIMOD contributed to multiple high-level sessions, including ‘Empowering Remote Communities: Pathways to Renewable Energy’ and ‘Renewable Energy Pathways for Maximising Socio-economic Benefits’, showcasing the



Before the training, I knew very little about the solar lift irrigation system. Now, I understand the basics, such as cleaning the solar panels twice a week, checking the cables regularly, and ensuring the system operates smoothly. The practical demonstrations made it easy to understand, even without textbooks.

Zangmo

Farmer, Punakha

WERELIS initiative in Bhutan, including the application of the MCA framework, decision-support platforms, and broader programme outcomes. At APFSD, ICIMOD was invited as a speaker in the session ‘Powering the Future: Advancing Gender and Social Inclusion in Climate and Energy Policies’, alongside key regional stakeholders including the ASEAN Centre for Energy, Asia Pacific Regional CSO Engagement Mechanism, UNEP Finance Initiative, and the Secretariat of the Pacific Regional Environment Programme. ICIMOD also took part in a forum organised by Global Network of Regional Sustainable Energy Centres (GN-SEC) in Vienna, which enables regional energy centres worldwide to share learning and accelerate the deployment of climate-resilient renewable energy and energy efficiency solutions. The Forum brought together policymakers, industry leaders, innovators, and development partners to accelerate sustainable energy and climate action worldwide.

These engagements introduced the PURE platform, DFS, and MCA frameworks to new audiences, and positioned Bhutan’s experience as a reference for other mountain and developing regions. In Bhutan, a high-level dialogue on advancing RE-powered lift irrigation systems was held on 3 July 2025 to present findings and recommendations to strengthen collaboration among stakeholders.



About Department of Energy

The Department of Energy (DoE) in Bhutan serves as the central coordinating agency for energy planning, policy implementation, and the promotion of energy and energy efficiency under the Ministry of Energy and Natural Resources. The Department of Energy is the focal point for all matters related to energy, power systems, and energy markets in Bhutan, including cross-border electricity trade.

About ICIMOD

The Hindu Kush Himalaya (HKH) region stretches 3,500 km across Asia, spanning eight countries – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan. Encompassing high-altitude mountain ranges, mid-hills, and plains, the zone is vital for the food, water, and energy security of up to two billion people and is a habitat for countless irreplaceable species. It is also acutely fragile and vulnerable to the impacts of the triple planetary crisis of climate change, pollution, and biodiversity loss.

The International Centre for Integrated Mountain Development (ICIMOD), based in Kathmandu, Nepal, is an international knowledge organisation focused on the HKH region, working since 1983 to deliver greener, more inclusive, and climate-resilient development. Our work is guided by our Strategy 2030, Medium-Term Action Plan V (2023–2026) and the associated Results Framework, and our various policies. Learn more on our website.

About IDRC

The International Development Research Centre (IDRC) supports research and innovation led by people closest to the world's toughest challenges. IDRC was founded on the belief that locally generated knowledge and innovation can help address inequality and advance sustainable development. More than 50 years later, this principle continues to guide its work.

IDRC invests in researchers, institutions and partnerships in low- and middle-income countries to generate evidence, develop practical solutions and inform policies that improve lives. Its work spans economic development, health, education and food systems, science and innovation, climate resilience, and human rights.

Headquartered in Ottawa, Canada, IDRC works globally through regional offices and partnerships that connect researchers and innovators across regions and disciplines to help build solutions that create lasting impact locally, regionally and globally.

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