RE Technologies for Agriculture

Surendra R Joshi

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ICIMOD

Outline of the presentation

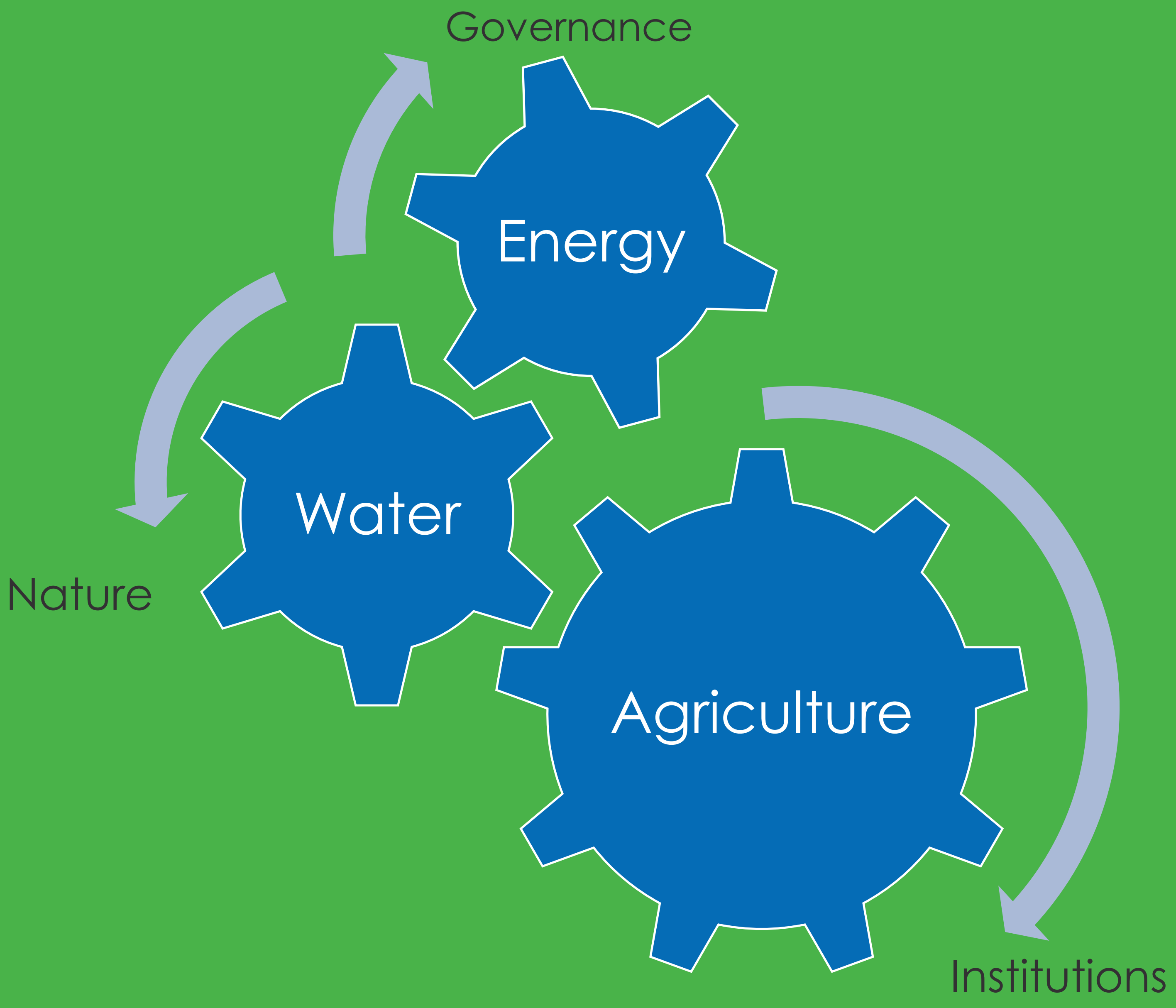
- ICIMOD and Hindu Kush Himalaya
- RE and agriculture nexus
- RE Technologies – ICIMOD's piloting on SPIPs


Among the world's most important global resources, the HKH—Hindu Kush Himalaya—water tower for Asia


The pulse of
the planet.

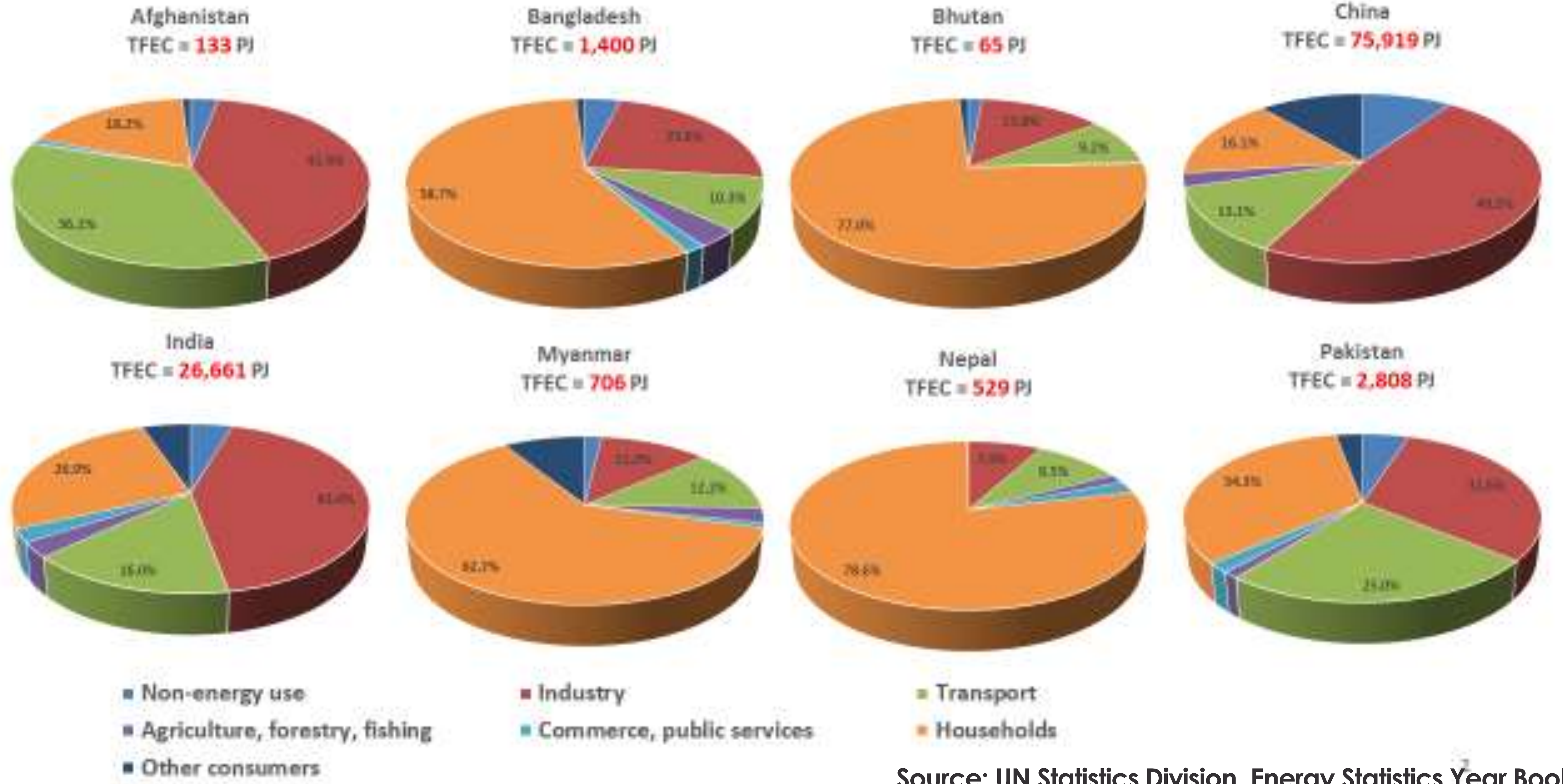
Water-energy-agriculture nexus

Water-energy-agriculture interdependent



The multiple and competing uses for water, energy and food production mean there are important trade-offs that should be considered, often between sectors that are not coordinated

Total Final Energy Consumption (TFEC) by Sector (2016)



Source: UN Statistics Division, Energy Statistics Year Book

Agriculture in Nepal – some facts

68% population derive livelihoods from agriculture

34% contribution to the GDP

4.6 million food-insecure people

40% children younger than five years of age are stunted

1.4 million malnourished pregnant and lactating women, & **48%** suffer from anemia

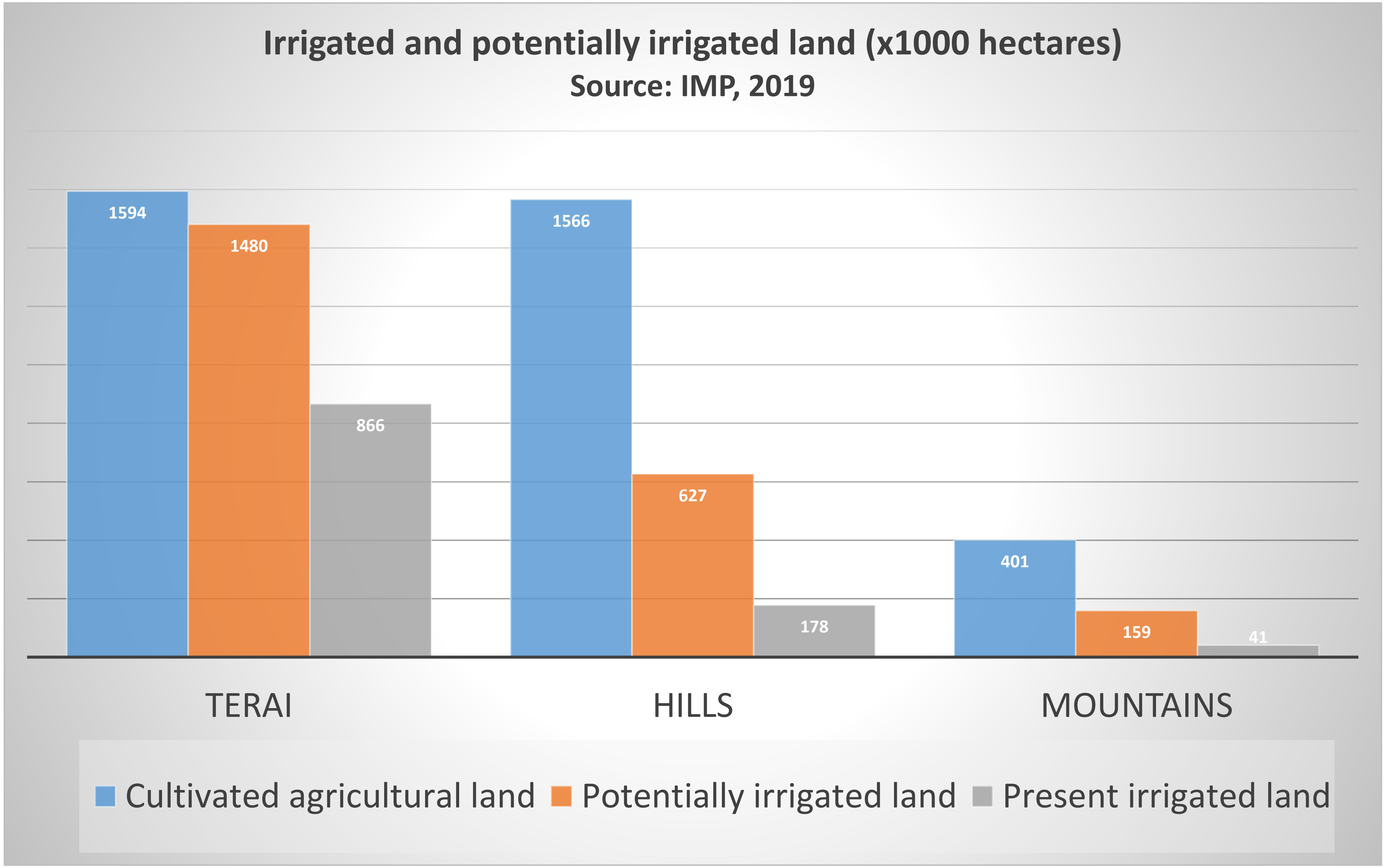
Only 1.1 million of the 3.5 million hectares of cultivated land (31%) is irrigated

50% irrigation is through surface irrigation schemes which are mostly fed by small and medium-sized rivers – with high fluctuation in water volume

1.18 million ha of land that could be irrigated still supports only rainfed agriculture

Challenge is to feed more people with less land and more uncertain conditions

RETs for agriculture – scope for irrigation



Land to be irrigated

- Terai – 41%
- Hills – 71%
- Mountains – 74%

Annual recharge of ground water in the Terai is 8.8 BCM, but less than a quarter of this is currently extracted

6.9 BCM groundwater could be used for irrigation

On average 5000–10,000 m3 /ha of water is required to cultivate cereal crops in South Asia

Solar powered irrigation pumps

Piloting – Solar powered irrigation pumps

Research questions:

- Can SPIP replace traditional irrigation pumps in a clean & cost effective way
- What are impacts of SPIPs on livelihoods – farmers income, crop productivity, cropping pattern
- What are impacts of SPIPs adoption in atmospheric pollution

How and where?

- 3-pilots with institutional variation: 1) women farmers using small diesel pumps; 2) Cooperative using large diesel pumps, 3) Men using electric pumps
- Saptari district – largest area under vegetable production, widespread use of diesel pumps, least HHs level electrification among all terai

Key findings

Comparative study of farmers who have adopted SPIPs and farmers who have not (but statistically similar to the former in all observable ways).

- SPIPs reduce reliance on electric and diesel pumps
- Replacement of diesel pumps reduced black carbon emissions
- Assured access to irrigation has increased crop diversification, nutrition, and incomes.
- SPIP has made it less physically intensive allowing woman farmers to operate it comfortably
- No risk of over abstraction - 1.4 BCM, from an estimated available balance of 6.9 BCM, could be pumped to irrigate in the Terai

Efficiency of solar powered pumps

A solar powered pump irrigates 3.7 hectares of land where seasonal vegetables are grown year round (Hardiya, Saptari)

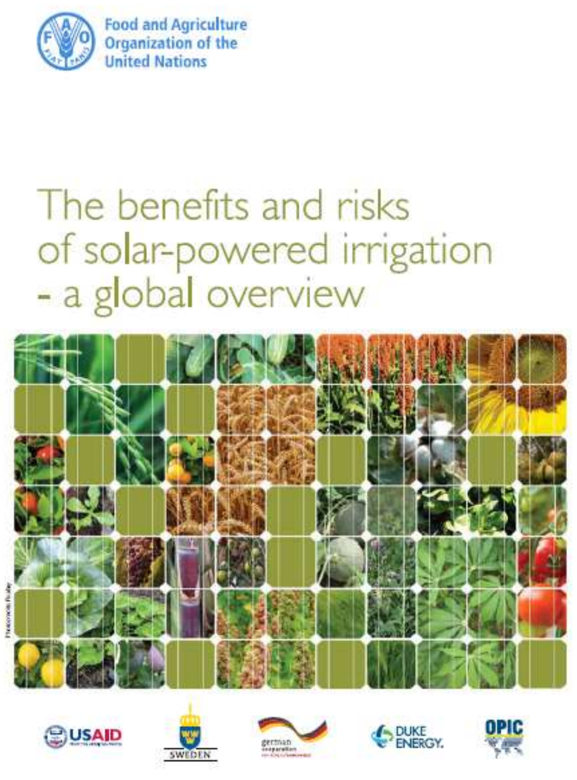
On an average, the pump's output is 80,000–90,000 litres per day.

On a sunny day, one-HP pump can discharge up to 16000 litres per hour and irrigate up to two and a half hectares of land.

Efficiency of SPIPs –

combination of water storage ponds, drip & sprinkle

Replication and out-scaling of SPIPs



https://lib.icimod.org/record/32565

Udayapur, Nepal

Passu and Moorkhon in Pakistan

Mobile SPIPs in Pakistan

Economic viability of SPIPs for apple orchard	
Criteria	Value
Net present value of SPIP	21 million PKR
Internal rate of return	31%
Benefit-cost ratio	4.96
Payback Period	10.92

RETs and Covid context

Changing energy needs & Covid-19 context

Rapid urbanization – aspirations of youths

Changing farming/business practices – towards mechanisation

Productive use to catalyse socio-economic development – green products

Productive use of energy – pathway to development

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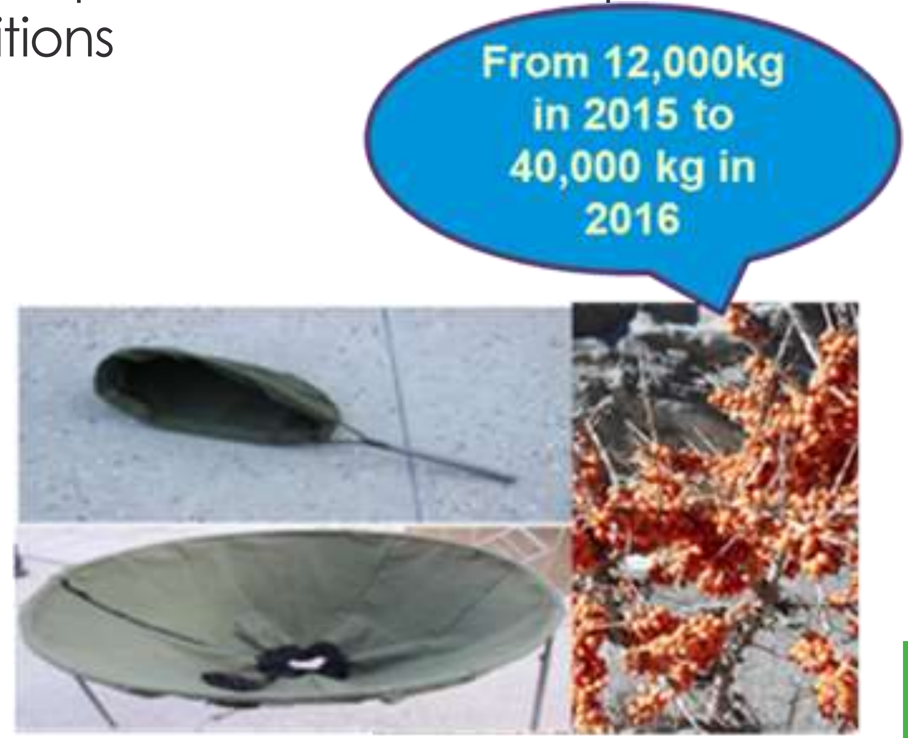
journal homepage: www.elsevier.com/locate/rser

Productive use of energy – Pathway to development? Reviewing the outcomes and impacts of small-scale energy projects in the global south

Julia Terrapon-Pfaff*, Marie-Christine Gröne, Carmen Dienst, Willington Ortiz

Wuppertal Institute for Climate, Environment and Energy, Döppersberg 19, 42103 Wuppertal, Germany

Small-scale energy projects can lead to productive uses, which result in positive outcomes/impacts for local living conditions



Productive use of energy – cont…

The use of RETs for agricultural VC means

- More value-added activities (grinding, milling, drying, storage)
- Reduced post harvest losses by providing heat and power for food preservation (drying, chilling and freezing)
- Better processing to translate products into stronger domestic enterprises for crops, fruits and spices,…..quality consistency, precision

Moving beyond business as usual

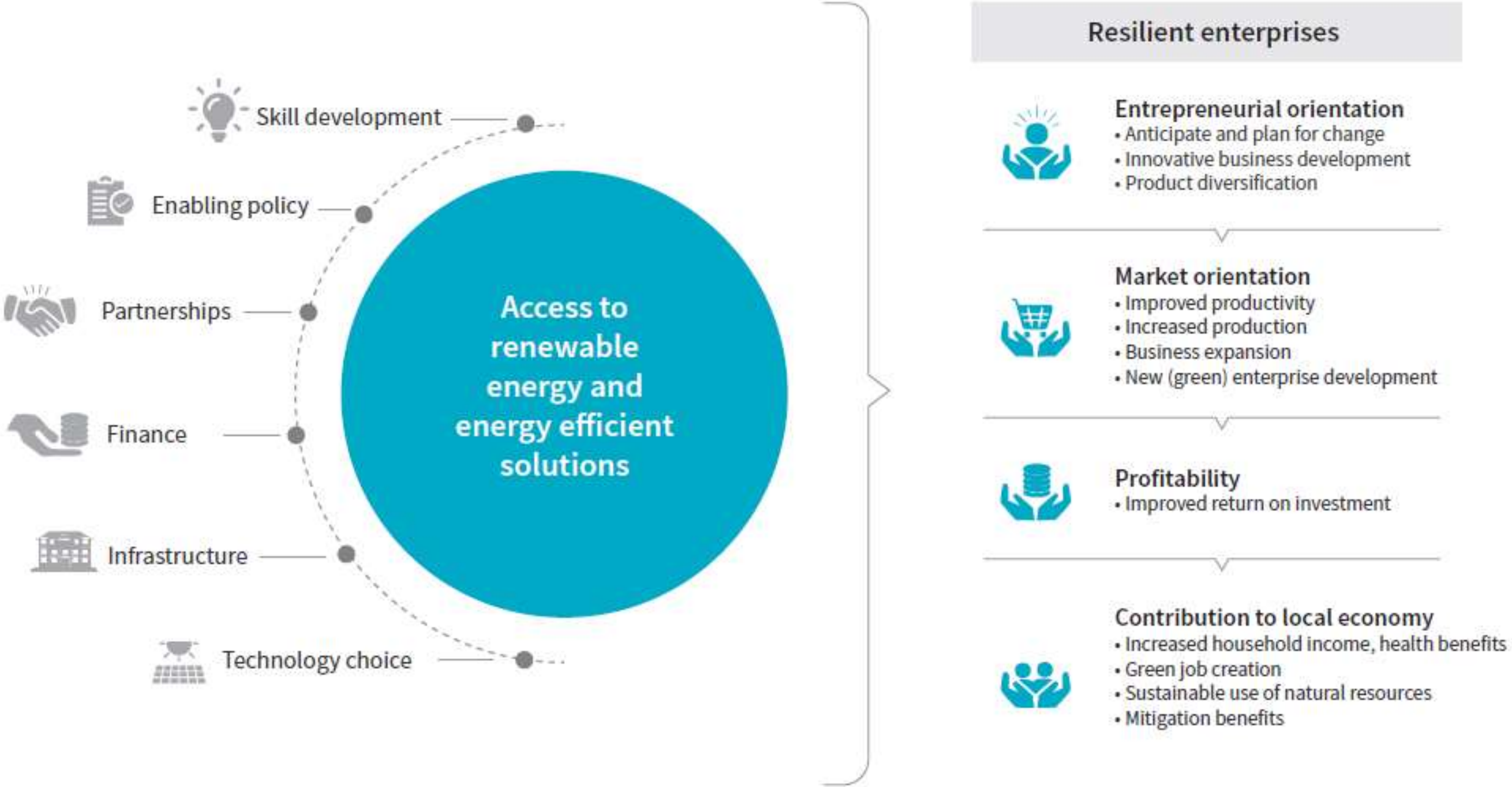
Competitive products (profit, market)

Quality and consistency

Food safety

Nature – resource sustainability

Ecosystem to promote RETs for agriculture



Thank you

Protect the pulse.