

Cost Comparison of Handpump Components

The West African Experience

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EXECUTIVE SUMMARY

Capital and recurrent costs for handpumps vary greatly from one type to another. This report presents an analysis of the cost variations found on the world market and permits to better situate the Vergnet Hydropump with respect to other types.

The price tag of a Vergnet contract almost always includes the procurement of material AND the delivery of support services. For example, a recent project in the Central Region of Ghana showed a global unit price of 1520 US\$ (9160 FF) per handpump, while the real price is 1075 US\$ (6460 FF) per unit; 30 % of the budget being allocated to shipping and handling, installation, profit, overhead and the implementation of a local after-sale service network.

Fortunately, the national decision-makers in the rural water supply (RWS) sector are shifting their primary focus from the reduction of initial material and installation costs to the evaluation of the systems' sustainability, in terms of the quality of services provided and the minimisation of recurrent costs.

Once all these elements are considered, the Vergnet Hydropump demonstrated its competitiveness during several invitations to tenders in the West Africa region, winning contracts on its merits of best quality/price ratio.

The price of a Vergnet Hydropump is often compared with the price of public domain handpumps, the latter being heavily backed by international agencies.

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These divergences illustrate the fundamental difference in approaches between a privately-run business - responsible for its own research and development activities, liable for numerous national after-sale services and involved in marketing activities - and a simple production structure. For example, for a similar production cost, the private company must sell with a value-added coefficient of 1.9, while the supported structure can offer its product with a coefficient of 1.3. This is all too often attained at the expense of no or little guarantees for the future.

Independent studies confirm that, for 1425 handpumps installed over 10 years, the Vergnet hydropump has the lowest maintenance costs: 24 US\$/year on average, parts and labor included.

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I - Cost Breakdown of a Handpump

When comparing handpump prices, major divergences appear, depending on the origin, the type of handpump and manufacturing sources. Higher retail prices alone do not explain this phenomenon: the adequacy of the material and the service provided are other factors to consider.

In addition to traditional costs such as installation, after-sale service, transportation, etc...(please refer to chapter II), three other criteria must be considered in the cost breakdown:

A) Description and Quantity of Material per Handpump

The standard handpump components are:

1. Pumpstand
2. Rising main (linear metre or 3 metres segment)
3. Drive shaft (linear metre or 3 metres segment)
4. Pump cylinder
5. Tightening braces

As options, or with separate unit prices, the following components may be offered:

6. Galvanized sealing frame
7. Assembly and installation tools
8. Security rope and collar
9. Assembly and installation notice

In order to analyse the supplier's proposal, the customer must take into account all the components described above and consider the total price of the handpump, including the total lengths of the rising main and drive shafts and any desired optional components.

While other suppliers indicate the cost breakdown by components and by linear metres required, Vergnet SA provides systematically the global price of its handpump, ready to install at the design depth and including ALL of the components listed above.

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B) Nature and Quality of Material Used

The components of the Vergnet Hydropump are completely corrosion-resistant. Its price must therefore be compared to the price of handpumps with similar anti-corrosion characteristics, generally using stainless steel rising main and drive shafts.

Update on the performance of the rubber sleeve (often called *baudruche*) of the Vergnet Hydropump

This component is the heart of the Hydropump hydraulic control system (please refer to the enclosed brochure explaining its basic operation principle). Since Vergnet SA took over the manufacturing of the *baudruche* from a sub-contractor in 1986, **20,000 Hydropumps** have been installed worldwide with an improved rubber sleeve. Our close monitoring showed that **over 7 years, less than 0.5% of the new type of *baudruche* have failed.**

C) Shipping Procedure and Complementary Services

The evaluation and comparison of handpump costs must also take into account the shipping procedure used: FOB, CIF, DDU, Site installation included.

Similarly, activities such as user training, implementation of an after-sale network, special agreements for site monitoring, etc... may be included in the unit price of the handpump.

Phase I of the Central Region Project in Ghana presents the following unit price for the Vergnet Hydropump:

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Description	Cost in FF	Cost in US\$
HYDROPUMP		
Hydropump shipped CIF at Tema Harbor, Ghana	6460	1077
Transit fees and transportation to Cape Coast	350	58
Sub-total Material	6810	1135
INSTALLATION AND MONITORING		
Transportation, installation and monitoring of spare parts network and area mechanics	1650	275
4 maintenance visits per site	500	84
Supply of a spare parts kit	100	17
Project start-up indemnities for 4 Regional parts distributors	50	8
Indemnities for Area mechanics for the first 2 maintenance visits	50	8
Sub-total Installation & Monitoring	2350	392
TOTAL	9160	1527

387 Hydropumps were installed during Phase I and another 292 are planned for Phase II of the Central Region Project in Ghana.

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II - Additionnal Costs

A village water point should operate without major intervention for 10 to 20 years. At the end of this period the handpump will be overhauled or replaced. A pump which requires major operation every 3 or 4 years due to corrosion is a pump whose real purchase price is several times that paid when initially installed.

The annual operation and maintenance (O&M) costs born by villages are a determining factor in defining whether or not a particular pump can be sustained by the local people. If these costs are too high, the pump will not be maintained and the water point will eventually cease to operate. Over the 20 year life of a village water point, O&M charges can exceed by several times the initial cost of the pump. Selecting equipment with proven, low O&M costs is essential to achieve sustainability.

From the very beginning of its service to the rural water supply, the Vergnet company has concentrated its efforts on driving down the lifetime costs of its equipment. This focus has led us to be more concerned with reducing the recurring costs and operations required to maintain our pumps in working condition rather than trying to build the cheapest pump in the market.

Today, we are confident in claiming that no other pump currently in use in the rural water supply sector comes close to the Vergnet Hydropump in terms of maintenance costs reduction.

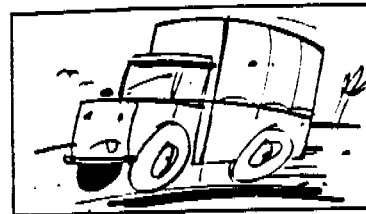
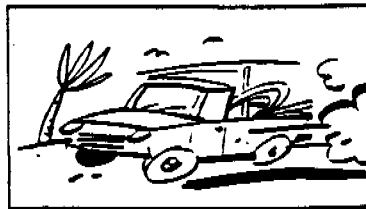
This objective was attained by limiting the number of wearing parts to a strict minimum and having a maintenance program which is truly sustainable by rural populations without any reliance on centralized maintenance brigades. No operation in this maintenance program depends on the availability of vehicular transport or lifting equipment.

**BUYING THE LEAST COST SERVICE
INSTEAD OF THE LEAST COST PUMP**

The real price of a pump

It is not only the purchase price; additional costs must be considered

FREIGHT CHARGES
(depend on weight & volume)



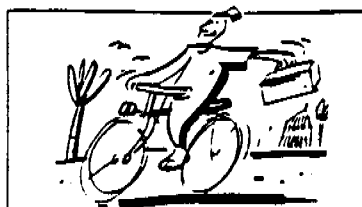
Transport costs in rural areas can represent a significant surcharge. Compact and lightweight equipment allows villagers to carry their pumps home in bush taxis.

INSTALLATION COST



The need to use heavy vehicles, highly trained technicians and specialized tools for installation can add 30% to the cost of the pump.

**COST OF REPAIR
AND MAINTENANCE**



Area mechanics are more profitable when they do not require motorized transportation to perform maintenance and repair operations.

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Buying equipment at what might seem to be bargain prices is taking a chance with the continuity of village water supplies. Who can calculate the hidden costs incurred when water supplies are interrupted because a pump is out of service? What is the value of the time lost when the village populations must return to collect water from earlier used sources? What are the health costs when these former sources do not provide safe drinking water?

Similarly, rust accumulation in improperly protected installations affects the taste of the water and can also drive villagers from pumped water supplies.

Considering that the pump typically represents no more than 10% of the installation cost of a water point and that an economy of 20% in the purchase price of the pump would only yield insignificant savings in this installation cost, who can justify running the risk of installing equipment that does not offer a reasonable chance of providing sustainable service?

It is unwise to pursue such small savings in initial costs while it results in significantly higher O&M costs onto the already severely stretched rural economy.

Cost Comparison of Handpump Components

III - Maintenance Cost of the Vergnet Hydropump

The following table illustrates the annual maintenance cost (including parts & labor) for 4 different projects, encompassing more than 1400 Hydropumps.

Name of project	Country	Number of Hydropumps installed	Number of years in operation	Average annual cost (CFA Francs)	Average annual cost (US\$)
Helvetas	Mali	797	3 to 13	5,872	20
ICHS	Burkina Faso	30	7	3,125	10
SODECOTON	Cameroun	100	3 to 13	7,000	23
Tillabéry	Niger	498	9 to 13	10,000	33

The average maintenance cost of a Vergnet Hydropump is about 24 US\$/year, a very competitive figure compared to other types of handpumps, and an affordable price for villagers.

Please refer to the various reports presented in Section VI.

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IV - Cost Comparison with a Subsidized Production

The following table represents the price structure of a product manufactured in a normal industrial environment with that of one which has been artificially subsidized and promoted:

Cost Element	Normal	Subsidized
Cost price	1.0	1.0
Development cost	0.1	0
Commercial cost	0.2	0.1
After-sale support network	0.4	0
Overhead	0.1	0.1
Profit	0.1	0.1
Sales price	1.9	1.3

A coefficient of 1.9 is correct and normal for the durable goods industry. A coefficient of only 1.3 leaves no margin to ensure the survival of a real industrial structure. It seems abundantly clear that subsidizing inefficient production will not be sustainable in the long term.

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**V - Situation of the Vergnet Hydropump
With Respect to the World Market****BURKINA FASO****MINISTERE DE L'EAU****International Call for Proposals****Financing : European Development Fund (EDF)****Rural Development Program, Sissili Province
Supply of 225 Handpumps****Result**

Rank	Company	Country	Pump type	Proposal amount CFA Francs	Proposal amount US\$
1	APICOMA	Burkina	India/Galva	67 625 000	225 415
2	COBOPLAST	Burkina	India/Galva	73 442 500	244 810
3	Vergnet	France	Hydropump	73 796 250	245 985
4	JEANTRADE	Netherland	Volanta	79 728 750	265 760
5	FASO YAAR/ABI	Ivory Coast	ABI	82 325 000	274 415
6	SOPEX	Belgium	Deplechin	84 284 568	280 950
7	SFCE	France	India	85 500 680	285 000
8	Preussag	Germany	Kardia	99 650 175	332 170
9	DIAFFA	Burkina	DIACFA	101 153 500	337 180
10	MAUPU	France	UPM	123 703 250	412 345
11	SOAEC	Burkina	Moyno	124 146 000	413 820
12	Project support	Netherland	Volanta	141 696 250	472 320

After technical and financial analysis,
Contract awarded to VERGNET - October 1992

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NIGERIA

Financing : European Development Fund (EDF)

Middle Belt Programme, Kwara State
Supply of 200 Handpumps and Materials Installation

Result

Rank	Company	Country	Pump type	Proposal amount CFA Francs	Proposal Amount US\$
1	OCNL	Nigeria	Unknown	48 741 000	162 470
2	Bt. Caves	Nigeria	Unknown	51 605 400	172 020
3	Bendhel	Nigeria	Unknown	56 466 000	188 220
4	Ratjem PSK	U. Kingdom	Unknown	61 279 500	204 265
5	Parthonick Roma	Netherland	Unknown	64 278 900	214 263
6	Precise Nigeria	Nigeria	Unknown	71 003 250	236 675
7	Vergnet	France	Hydropump	73 072 500	243 575
8	Cox Roy Ltd	U. Kingdom	Unknown	75 555 000	251 850
9	Muntgi Pipes	Nigeria	Unknown	76 499 700	255 000
10	Better Deal	Nigeria	Unknown	82 514 600	275 050
11	Sovema	France	India	85 222 000	284 075
12	SCOA	Nigeria	Unknown	87 802 200	292 675
13	Crosseas Ltd	Nigeria	Unknown	89 205 000	297 350
14	John Howe Group	United Kingdom	Unknown	90 194 550	300 650
15	Olanko Johnson	Nigeria	Unknown	98 400 250	328 000
16	Kayo Proscos	Nigeria	Unknown	111 600 800	372 000
17	BOM	Nigeria	Unknown	115 852 250	386 175
18	Skoda Eng'ing	Nigeria	Unknown	123 520 000	411 730
19	Wandel International	Nigeria	Unknown	124 037 000	413 455
20	Meera & Caiko	Inde	India	124 037 700	413 460
21	Mec. Eng'ing	Nigeria	Unknown	125 520 000	418 400
22	GPL	Nigeria	Unknown	131 420 900	438 070
23	Suntec	Nigeria	Unknown	136 500 000	455 000
24	HP Intern'l	U. Kingdom	Unknown	142 680 000	475 600
25	Tony Marcus	U. Kingdom	Unknown	154 960 550	516 535
26	Yahkwa Fisheries	Nigeria	Unknown	213 000 000	710 000
27	Harn Sona	Nigeria	Unknown	231 531 000	771 770
28	Aloya	Nigeria	Unknown	251 125 850	837 085

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MALI

MINISTERE DES MINES, DE L'INDUSTRIE ET DE L'ENERGIE

Limited call for proposals

Financing : European Development Fund (EDF)

Groundwater Rehabilitation Program, Bankass et Koro Communities
Supply and Installation of 52 Handpumps

Result

Rank	Company	Country	Pump type	Proposal amount CFA Francs	Proposal amount US\$
1	Vergnet	France	Hydropump	34 894 250	116 315
2	Preussag	Germany	Kardia	47 585 380	158 620
3	UPM/Somafrec	France/Mali	UPM	59 507 070	198 355
4	SETRA	Mali	Duba	83 737 130	279 125

Proposals being evaluated, Vergnet - July 1993

BENIN

MINISTERE DE L'ENERGIE, DES MINES ET DE L'HYDRAULIQUE

Limited call for proposals

Financing : Islamic Development Bank (IDB)

Integrated Rural Development Program, Province of Oueme
Supply and Installation of 50 handpumps

Result

Rank	Company	Country	Pump Type	Proposal amount CFA Francs	Proposal amount US\$
1	Vergnet	France	Hydropump	29 795 000	99 315
2	JUPITER	Bénin	India	35 125 000	117 085
3	SATT	Bénin	UPM	40 271 506	134 240

After financial & technical evaluation, Contract awarded to VERGNET - June 1993

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**VI - Excerpts from Various Reports
Showing the Maintenance Costs Associated
with the Vergnet Hydropump**

**COUTS D'ENTRETIEN DES POMPES VERGNET
SUR LE PROJET HELVETAS MALI**

Extraits du rapport de mission de

M. Daniel WEGMANN

**Consultant
Haldenstrasse 135
8055 ZURICH
SUISSE**

12 Janvier 1992

**POMPES VERGNET INSTALLEES DANS LA ZONE DU PROJET
ENTRE**

1980 ET LE 31 AOUT 1991 : 797

AGE DES POMPES :

ENTRE 1 ET 11 ANS

TAUX DE FONCTIONNEMENT :

ENVIRON 90%

**COUT D'ENTRETIEN ANNUEL MOYEN PAR
POMPE VERGNET :**

5 872 FCFA (dont 4 840 FCFA de pièces)

FIABILITE DES CHIFFRES :

- nombreuses listes et fiches tenues par l'UMF (unité de maintenance et formation)
- la fourniture gratuite de certaines pièces et de services dépasse au maximum 15% des chiffres ci-dessus.

CONCLUSIONS :

LA POMPE VERGNET EST UNE POMPE TRES FIABLE

- Le coût d'entretien a baissé de 1987 à 1990 (meilleure fiabilité de la boudruche).

Note de Vergnet :

En se basant sur un puisage journalier de 4m³ sur 8 mois de l'année, on obtient environ 1000 m³ pour un coût de 6 000 FCFA soit 6 FCFA le m³.

Même si ce coût devait être triplé (maintenance régulière, remplacement de pièces d'usure en temps préconisé par le constructeur), le coût du m³ demeurerait inférieur à 20 FCFA.

GENERAL SECRETARIAT
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TELEX : ICHS 5277 BF

GOOD BEHAVIOUR ATTESTATION

Object : 30 Vergnet Hydropumps in the Yatenga area - BURKINA FASO.
Assessment by ICHS in 1990 October.

Thirty (30) Vergnet Hydropumps located in Yatenga province (Burkina Faso) have been checked up on October 1990 for the third time from their installation (4 years ago). This check has revealed a fairly good behaviour of this model of pump and peculiarly of their "baudruches" (Vergnet made baudruches) giving :

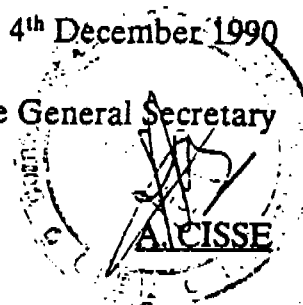
- a low yearly maintenance cost : 3125 F CFA/year/pump including 2230 F CFA of spare parts for a satisfactory service for the users,
- an average lifetime for main wearing parts (guide bushing, piston seals, lower stop ring, piston) between 17 and 36 months,
- an excellent quality of "Vergnet" baudruches which have shown no break, no change and no cracks (10% of the baudruches have been thoroughly examined). The baudruches have the same pumping rates from the beginning. From this, one can expect an average lifetime far longer than 5 years.

Nota : locations in use for this survey have been selected on very difficult to meet working criteria :

- high water depth : 30 to 50 m,
- high level of use : more than 8 hours per day.

Written in Ouagadougou , the 4th December 1990

The General Secretary



SOCIÉTÉ DE DÉVELOPPEMENT DU COTON DU CAMEROUN
SOCIÉTÉ DE DÉVELOPPEMENT AU CAPITAL DE 4.529.400.000 F.C.F.A.



N° 034/91/DG/ADP/AA/NAM

Garoua, le 11 Mars 1991

A Monsieur le Directeur
Vergnet S.A.

Monsieur,

Suite à votre demande du 25/02/91, veuillez trouver ci-joint les éléments de réponse à votre questionnaire :

Pays : CAMEROUN

Région : NORD

Projet : SODECOTON

Nombre de pompes installées : 150

Nombre de pompes Vergoet : 100

Période installation : de 1980 à 1990

Coût d'entretien annuel : de 3 000 à 10 000 F.CFA/an.

Nombre d'interventions annuelles moyennes : 20 pour 100 pompes

Type de maintenance : Technicien du Projet

Vente pièces détachées : Magasin Projet

Mode paiement des pièces : Facturation suivant intervention

Fait à Garoua, le 11 Mars 1991

Le Chef de Projet,

A. ABA



**REPUBLIQUE DU NIGER
MINISTERE DES RESSOURCES ANIMALES
ET DE L'HYDRAULIQUE
DIRECTION DES INFRASTRUCTURES
HYDRAULIQUES
SERVICE DE LA MAINTENANCE**

**MAINTENANCE DES POMPES
DANS
LE DEPARTEMENT DE TILLABERY**

PROJET

**MAINTENANCE DE POMPES
DANS LE LIPTAKO**

FINANCEMENT FAC

L'étude a été terminée en mars 1987.

Elle concerne 498 pompes situées dans tout le département.
L'âge des pompes varie de 4 à 7 ans.

Nous avons éliminé les pompes restées en panne pendant plus d'un an sans être réparées.

Le détail des pièces qui ont été changées sur chaque pompe nous a été communiqué par les villageois. Comme aucune dépense n'a été notée, on peut penser que les données de l'étude risquent d'être sous-estimées.

Le tableau ci-dessous représente les dépenses annuelles pour la réparation de ces pompes.

Ces montants correspondent à l'achat des pièces et à la rémunération des artisans réparateurs, cette dernière étant faible.

5 pompes ont occasionné pour plus de 75.000 F de dépenses, avec une valeur maximale à 89.850 francs.

2 pompes ont occasionné pour 110.000 F de dépenses.

DEPENSES ANNUELLES D'ENTRETIEN

< 10.000 F	10 à 25.000 F	26 à 50.000 F	51 à 75.000 F	76 à 100.000 F
337 pompes	97 pompes	48 pompes	9 pompes	5 pompes
68 %	19 %	10 %	2 %	1 %

Total des pompes considérées : 498

En considérant que la pompe ne tombe jamais en panne, les seules pièces à changer sont les pièces d'usure (1 piston, 4 segments, 1 bague de guidage, 2 buttées basses). Leur remplacement est annuel et représente une dépense de 12.000 F par an.

68 % des pompes ont un coût d'entretien annuel inférieur à 10.000 F. Ceci confirme que le remplacement de ces pièces n'est pas effectué normalement. De nombreuses pompes fonctionnent avec des pièces complètement usées, entraînant une diminution du débit.

Les villageois faisant rarement d'entretien préventif, seul l'arrêt total de la pompe entraîne un remplacement de pièces.

VERGNET HYDROPUMP

Used by villagers, maintained by villagers

1

Thanks to a hydraulic control system, none of the usual mechanical moving parts are to be found on the pump (rod, spindle, bearing), so that it can operate in the worst conditions, with no risk of corrosion.

2

The Hydropump is a "VLOM" (village level operation and maintenance) i.e. it can be installed by villagers and their local craftsmen. The few wearing parts to be replaced periodically are cheap and accessible without having to take the pump apart.

3

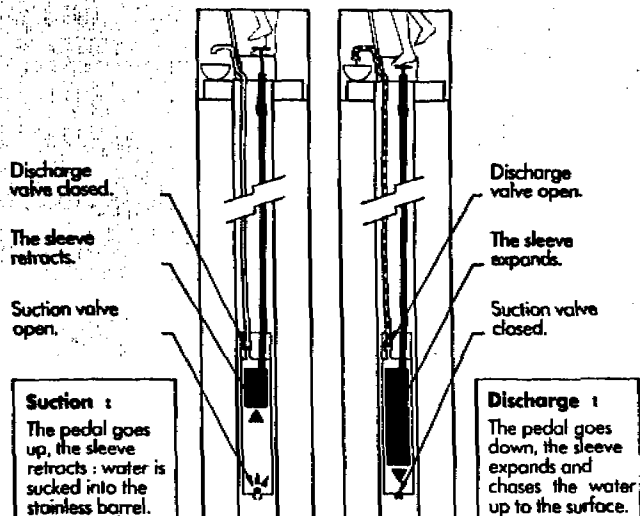
3000 craftsmen in Africa are already trained to take the pump into pieces, without the need of any special tools or lifting equipment.

4

A new model is available with 20% to 50% greater performance for shallow medium depths. A new design based on ergonomic studies to develop more comfortable features retains all the advantages of the traditional hydro-pump.

its principle

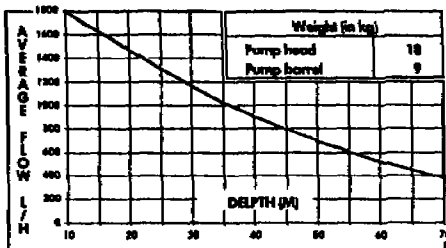
A pump with hydraulic control which causes a rubber sleeve to change shape. With each stroke of pedal, the hydraulic control causes the sleeve to expand, resulting in the delivery of about 1/2 litre of water.



Control at ground level, with easy access for maintenance.

Pumping at static even for more than 70 metres (230 feet).

Immersed stainless steel barrel no maintenance required.

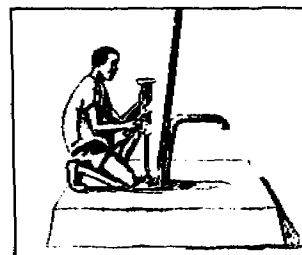
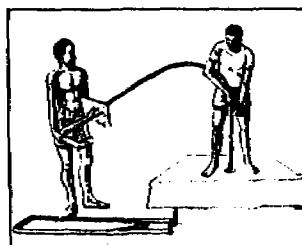


its advantages

Pump head : All the wearing parts are to be found on this body only and can be directly accessed :

- pedal drive
- piston rings
- rubber stop
- piston

These parts are cheap and can be replaced within a few minutes.

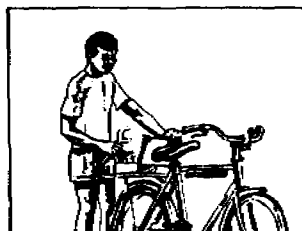


Immersed barrel with no mechanical part : no friction, therefore no wear, no corrosion.

All these advantages confer to the VERGNET Hydropump the lowest real cost on the market (the actual pump, installation and maintenance).

The rubber sleeve and the valves are the only moving parts in the barrel ; the sleeve operates in optimal conditions : sheltered from UV and immersed in water. It has been subjected to the most severe fatigue tests.

Light maintenance equipment : periodic maintenance is performed by the user with a simple spanner supplied with the pump.



Installed within an hour, with no lifting equipment : two people can handle it. The use of polythene tubes and the light weight of the barrel allow the pump to be installed within an hour.

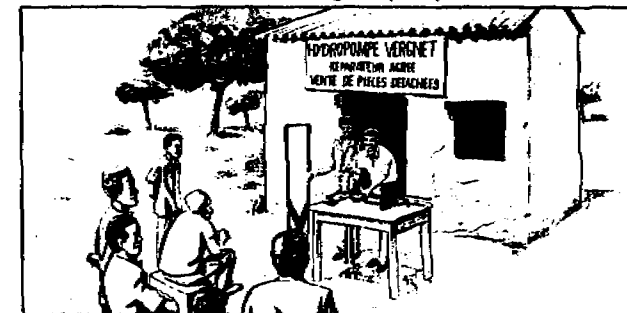
Several VERGNET Hydropumps can be used on the same drill hole for better water flow.

You can rely on this simple and economical pump for years.

VERGNET S.A. Policy

Local presence, joint venture and achievement based on results.

"Water supply mustn't be cut because of a shortage of spare parts..."



1 We want to insure continuity in water supplying thanks to :
- the availability of locally manufactured spare wearing parts.
- a transferred technology that will allow partial manufacturing of the pumps.

2 We want to be close to the users with an efficient spare parts distribution network.

3 We want to train local craftsmen (in maintenance, repair work, management of stock of wearing parts) and increase villagers awareness (of maintenance problems, water hygiene).

4 We want to innovate by getting the craftsman more involved and by promoting original maintenance structures (concession on the source).

5 We want to recommission old pumps and bring them back to good performance, with a guarantee of good operating, and also by transferring skills to villagers so that they can manage the pumps on their own.

6 Our permanent goal is : supply water for development.