Small solar applications

Innovative battery systems

ARTS ENERGY

Advanced Rechargeable Technology and Solutions

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The rise
of small solar applications

Small solar applications are arriving in force in the marketplace, driven by an array of technical, economic and environmental factors, and bringing an urgent need for reliable energy storage solutions.
Meeting this challenge – and building on its long experience in the advanced battery industry – ARTS Energy has developed a range of cutting-edge nickel-based battery systems that provide unequalled performance, reliability and durability.

A broad range of small solar applications has already been developed – and the field is growing by the day. Key applications include:

Solar Street Lights (SSL)

The introduction of the light-emitting diode (LED) has sharply reduced the power consumption needs of streetlights. Using a LED, an SSL can be powered by a small solar panel, which charges a battery system during the day for use at night.

Road signs and municipal signs

Solar panels can power a wide range of illuminated signs, including traffic alerts speed limit signs, municipal displays, scrolling billboards, etc.

Machine-to-machine (M2M) applications

Solar-powered M2M applications can be used to enhance safety, prevent industrial and environmental damage, and better control resource consumption. M2M applications acquire data using sensors, transmit the data and then trigger an action.

Meteorological applications

Meteorological applications can use solar power to acquire weather data in isolated areas not served by the electric power grid.

Buoys

Solar-powered buoys play a major role in scientific contexts, for measuring sea temperatures and currents, as well as in the commercial fishing industry, for measuring fish stocks.

ARTS Energy: meeting your needs

At ARTS Energy, we're close to you, with manufacturing facility in France, and a worldwide sales network. Most importantly, we listen to you – and develop batteries to meet your needs.



Why choose Ni-MH?

ARTS Energy's innovative Nickel–Metal Hydride (Ni-MH) technology offers a host of valuable features for small solar applications:

- Very long service life, even in hot countries
- Lower total cost of ownership (TCO), thanks to lower installation costs, easier maintenance and longer service life
- Simplified deployment for solar street lights, with no excavation needed
- Innovative design, including a slimmer battery
- Fast charge, and efficient charge and discharge in a very large range of temperatures
- No sudden death; no sudden «end of discharge»
- Reduced energy consumption, due to an intelligent network that connects the solar panel, battery and application

ARTS Energy: more than a supplier, we're your partner

ARTS Energy has developed a complete range of Ni-MH battery systems focused on performance and reliability – just like your applications. Our offering includes:

- Small-format, standard VHT batteries (AA, Cs, 7/5 Cs, F size)
- Smart VHT modules and photovoltaic (PV) modules
- Tubular PV modules (Extensolar)
- Larger, more complex systems

We're serious about the environment

ARTS Energy Ni-MH batteries are environmentally friendly, ISO 14001-certified and RoHS-compliant.

Environmental impact of a single-cell VHT F battery (1.2 V-10 Ah)

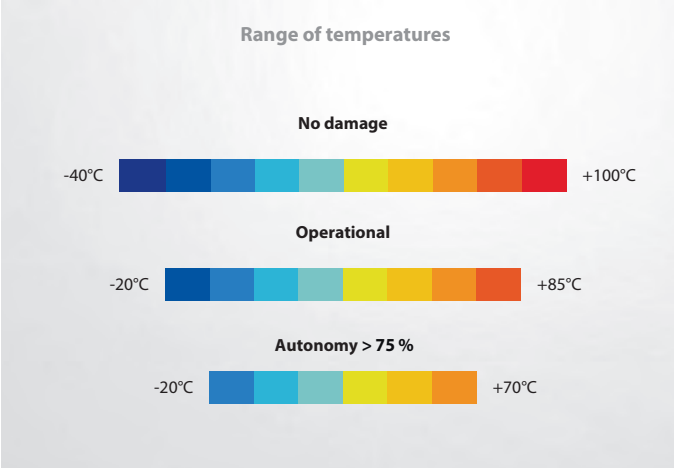
Environmental impact	Name	Unit	per g of VHT	1 VHT F
RMD	Raw Material Depletion	Y-1	5.5 1E-17	1.18E-14
ED	Energy Depletion	MJ	0.155	3.33E+01
WD	Water Depletion	dm 3	0.729	1.57E+02
GW	Global Warming Potential	g~CO2	7.62	1.64E+03
OD	Ozone Depletion	g~CFC-11	4.47E-O7	9.61E-05
AT	Air Toxicity	m3	15580	3.35E+06
POC	Photochemical Ozone Creation	Yg~C2H4	0.00341	7.33E-01
AA	Air Acidification	g~H+	0.0123	2.64E+00
WT	Water Toxicity	dm 3	0.452	9.72E+01
WE	Water Eutrophication	g~PO4	0.0349	7.50E+00
HWP	Hazardous Waste Production	kg	1.68E-05	3.61E-03

Project supported by the French Environment and Energy Management Agency

Exceptional
electrical performance

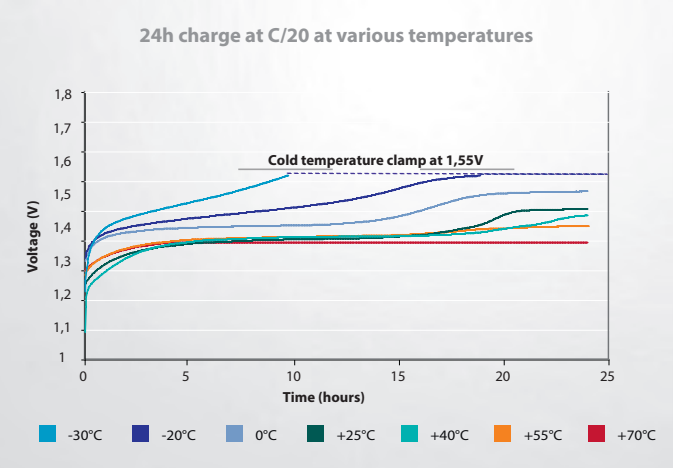
Exceptional range of temperatures

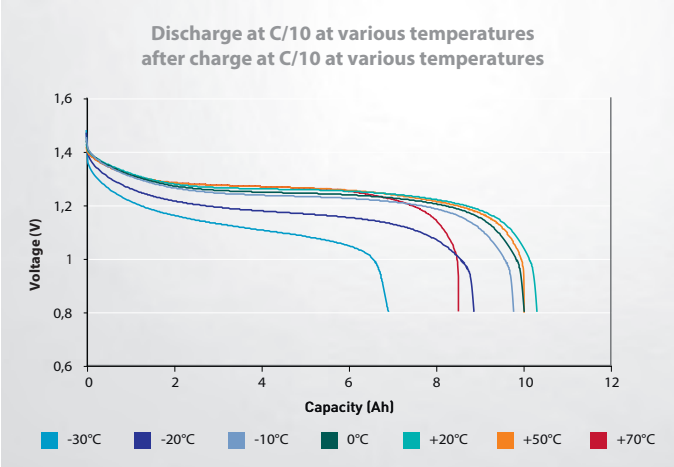
ARTS Energy's high quality, highly reliable Ni-MH batteries function in an exceptionally broad range of temperatures: from - 40°C to + 70°C. This makes them the perfect fit for hot climates or placement inside lampposts for SSL applications.



Excellent charge efficiency at very low and very high temperatures

ARTS Energy Ni-MH batteries offer higher than 95% charge efficiency between - 40°C and + 70°C.

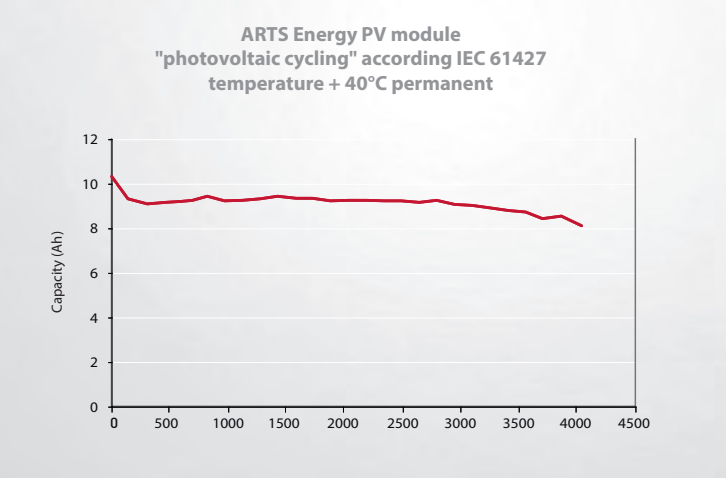




Excellent discharge efficiency at very low and very high temperatures

ARTS Energy Ni-MH batteries offer excellent discharge efficiency between - 20°C and + 70°C,
and are operational between - 40°C and + 85°C.

Exceptional **durability**



ARTS Energy Ni-MH batteries offer unrivalled durability, with :

- A service life of 7-8 years in the world's hottest country
- A service life of 10-15 years in countries with temperate climates
- More than 4000 cycles in the IEC 61427 accelerated ageing test (at a continuous + 40°C)

Fully integrated, **intelligent and effective**

ARTS Energy modules are equipped with a fully integrated Battery Management System (BMS) and communication interface, to ensure optimum performance and reliability. The BMS provides plug-and-play connectivity for Smart VHT, PV and Tubular PV modules.

The BMS exchanges information with the solar panel and the application to :

- Optimise behaviour of the entire system
- Utilise the maximum energy supplied by the solar panel (3A maximum charge current per module; 4A under study)
- Manage the charging current to optimise service life when the battery is fully charged
- Reduce the application's power consumption, through knowledge of the state of charge (SOC)

The communication interface displays key parameters, including :

- State of health (SOH), enabling preventive maintenance and eliminating the risk of sudden death
- Historical data, which is vital for dimensioning the system, and for warrantee purposes.

Multiple applications, just one solution: ARTS Energy

ARTS Energy's cutting-edge Ni-MH battery systems offer an ideal solution in extreme temperature environments for reliable, long-life, high-performance energy-storage solutions – whatever your small solar application.

Standard small VHT batteries

ARTS Energy offers small standalone batteries with no electronics, in a stick or side-by-side configuration. For these products, the customer uses simple electronics to manage battery charge and discharge.

	VHT AA 800	VHT AA	VHT Cs	VHT 7/5Cs	VHT D	VHT F
Voltage (V)	1.2	1.2	1.2	1.2	1.2	1.2
Nominal capacity (mAh)	800	1100	2000	4000	6000	10000
Typical capacity (mAh)	840	1150	2200	4200	6450	11000
Diameter	14.0	14.0	22.0	22.2	32.3	32.3
Height (mm)	49.3	49.3	42.7	60.0	58.6	89.2
Weight (g)	22	24	48	74	135	215

Prismatic configurations : Smart VHT and PV modules

As part of its standard range, ARTS Energy also offers advanced battery systems in prismatic configurations. These systems include management, control and communication capabilities and enable parallel assemblies that fit your exact specifications. These systems include:

- Smart VHT modules, which are encased in ABS plastic and feature easy connectivity
- PV modules, which are rated IP54 for outdoor use and feature a ruggedized design, with an anodised aluminum casing to withstand shocks and vibrations.

Smart VHT module

Configuration	10S	20S	20S	30S	30S	10S2P	20S2P
Voltage (V)	12	24	24	36	36	12	24
Capacity (Ah)	10	6	10	6	10	20	20
Energy (Wh)	120	144	240	216	360	240	480
Mechanical characteristics							
Height (mm)	129	158	219	217	309	219	395
Length (mm)	178	178	178	178	178	178	178
Width (mm)	73,5	73,5	73,5	73,5	73,5	73,5	73,5
Weight (kg)	2,7	2,7	4,8	4,1	6,9	4,8	9,2
Volume (liter)	1,7	2,1	2,9	2,8	4,0	2,9	5.2
Specific energy							
Specific energy (Wh/kg)	44	53	50	53	52	50	52
Energy density (Wh/liter)	71	69	84	77	89	84	93

PV module

Configuration	20S	30S	10S2P	20S2P
Voltage (V)	24	36	12	24
Capacity (Ah)	10	10	20	20
Energy (Wh)	240	360	240	480
Mechanical characteristics				
Height (mm)	231	320	231	410
Length (mm)	185	185	185	185
Width (mm)	81	81	81	81
Weight (kg)	5,5	8,1	5,5	10,8
volume (liter)	3,5	4,8	3,5	6,1
Specific energy				
Specific energy (Wh/kg)	44	44	44	44
Energy density(Wh/liter)	69	75	69	78

ARTS Energy's Tubular PV module: your solution for solar streetlights

Strongly committed to innovation, ARTS Energy invests heavily in R&D to keep ahead of market needs. This is why we developed the Tubular PV module, an advanced battery system that integrates all electronics and is designed for placement inside the pole of a solar streetlight. This advantageous design :

- Avoids theft of a battery that is placed in a cabinet on the ground
- Avoids unsightly placement at the top of the pole, which is inconvenient for battery replacement and requires reinforcement of the pole
- Eliminates the need for excavation to place the battery underground

Key benefits of the Tubular PV module:

- Rated IP65 for outdoor use, to withstand very aggressive outdoor environments
- Features a slim 140 mm diameter, making it an excellent choice for solar applications where battery thickness is key
- Lowers TCO through an unmatched service life and reduced installation and maintenance costs.

extensolar

Configuration	10S2P	20S	20S2P	30S2P
Voltage (V)	12	24	24	36
Capacity (Ah)	20	10	20	20
Energy (Wh)	240	240	480	720
Mechanical characteristics				
Length (mm)	300	300	475	650
Diameter (mm)	140	140	140	140
Weight (kg)	6	6	11	15,5
volume (liter)	4,6	4,6	7,3	9,2
Specific energy				
Specific energy (Wh/kg)	40	40	44	46
Energy density (Wh/liter)	52	52	66	78

Complex battery systems

ARTS Energy offers complex battery systems, for applications in which solar panels and batteries are centralised. These systems, which feature a maximum discharge current of 20A :

- Facilitate maintenance, by making it easier to clean the solar panels
- Improve synchronization, enabling lights to be turned on and off simultaneously
- Simplify migration to a solar energy supply, for existing lighting systems that are powered by the grid.

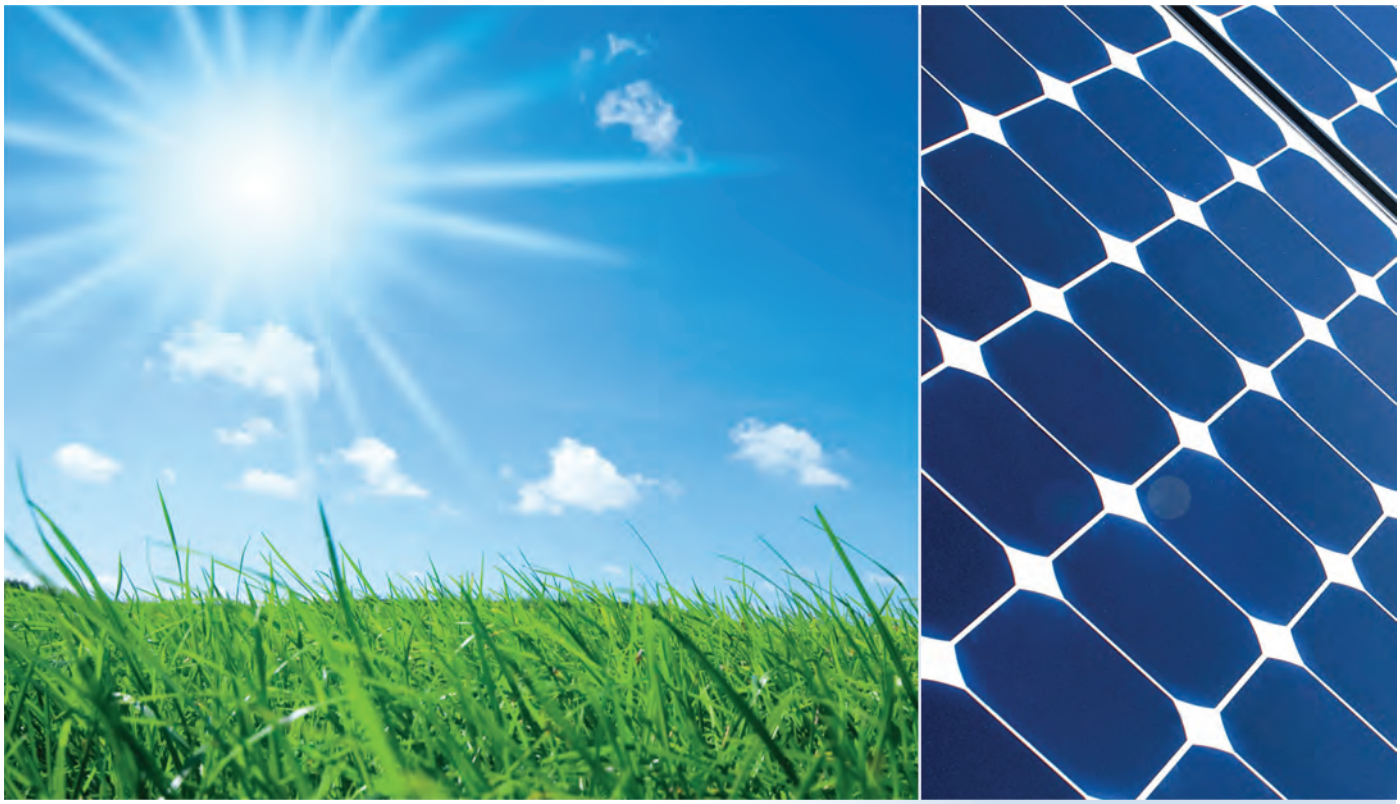
Complex battery systems

Configuration (modules)	10P	20P	10P	20P
Voltage (V)	12	12	24	24
Capacity (Ah)	200	400	200	400
Energy (Wh)	2400	4800	4800	9600
Mechanical characteristics				
Height (mm)	219	219	395	395
Length (mm)	735	735	735	735
Width (mm)	178	356	178	356
Weight (kg)	48	96	92	184
volume (liter)	29	57	52	103
Specific energy				
Specific energy (Wh/kg)	50	50	52	52
Energy density(Wh/liter)	84	84	93	93

ARTS Energy is committed to the highest standards of environmental stewardship

As part of its environmental commitment, ARTS Energy gives priority to recycled raw materials over virgin raw materials, reduces its plant's air and water releases year after year, minimizes water usage, reduces fossil energy consumption and associated CO_2 emissions, and ensures that its customers have recycling solutions for their spent batteries. Regarding industrial batteries, ARTS Energy has had partnerships for many years with collection companies in most EU countries, in North America and in other countries. This collection network receives and dispatches our customers batteries at the end of their lives to fully approved recycling facilities, in compliance with the laws governing trans-boundary waste shipments.

ARTS Energy has selected a recycling process for industrial lithium-ion cells with very high recycling efficiency. A list of our current collection points is available on our web site. In other countries, ARTS Energy assists users of its batteries in finding environmentally sound recycling solutions. Please contact your sales representative for further information.



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