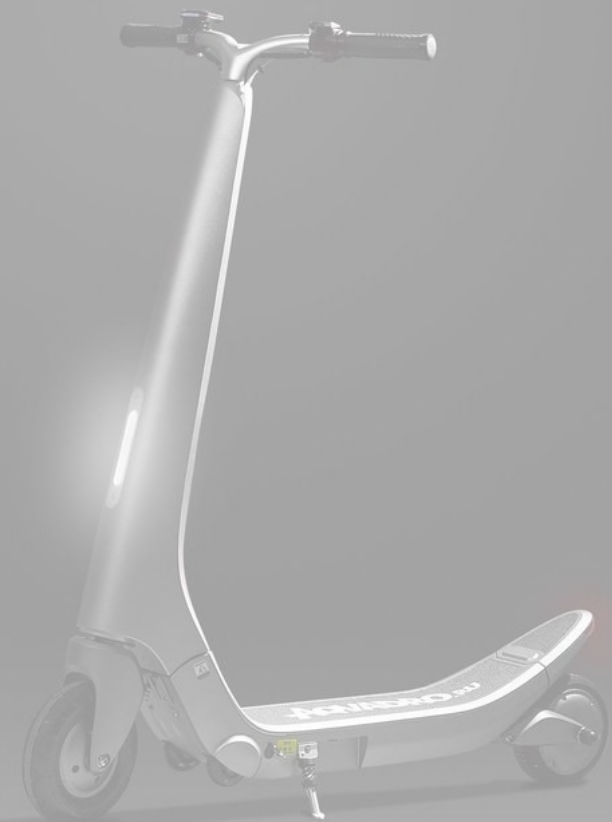

Хранение, транспортирование и переработка отходов Li-ion батарей

MEGAPOLIS  **RESOURCE**

2023



НАС ОКРУЖАЕТ



КОТОРАЯ ПИТАЕТСЯ



ОТ LI-ION АККУМУЛЯТОРОВ

ТИПЫ LI-ION БАТАРЕЙ

1

LiCoO2

Мобильная электроника

2

LiMn2O4

Электрические силовые агрегаты,
медицинское оборудование,
электроинструмент.

3

NMC

Системы безопасности, аварийное
освещение, телекоммуникации,
электротранспорт т.д.

4

LFP

Стационарные и портативные
специализированные устройства

5

NCA

Электрические силовые агрегаты,
промышленность и медицинское
оборудование.

6

LTO

Уличное освещение на солнечных
элементах, электрические силовые
агрегаты автомобилей.



ICR vs IFR

CHARGER

- Корпус, (пластик) — 45,6 г
 - Аккумулятор LiCo — 50,8 г
 - Плата электронная — 3,21 г
 - Пружина кольцевая — 0,25г
(Ni 27%, Cr 15%)
 - Пружина плоская прижимная —
0,25г (Ni 7%, Cr 16%)
 - Пружина плоская с пласт. кнопкой —
0,46г (Ni 7%, Cr 16%)
-
- Общий вес: 100,6 г



HOLDER

- Пластик — 6,53 г
 - Пластмасса и металл впаяный — 0,96 г
 - Металл пластины — 1,29 г
(Cu 76%, Ni 18%, Sn 5%)
 - Алюминиевая трубка — 2,21 г
 - Плата электронная — 1,20 г
 - Аккумулятор LiFeP — 7,12 г
 - Керамика — 0,34 г,
в т.ч. нагреватель — 0,1г (Pt, Au)
-
- Общий вес: 19,65 г



ЖИЗНЕННЫЙ ЦИКЛ БАТАРЕЙ

СРОК СЛУЖБЫ АККУМУЛЯТОРА

От 1 использования до 10 лет.

Гарантийный срок батареи Tesla проданной в 2015
году - 8 лет или заканчивается в **2023!**



3R - REUSE

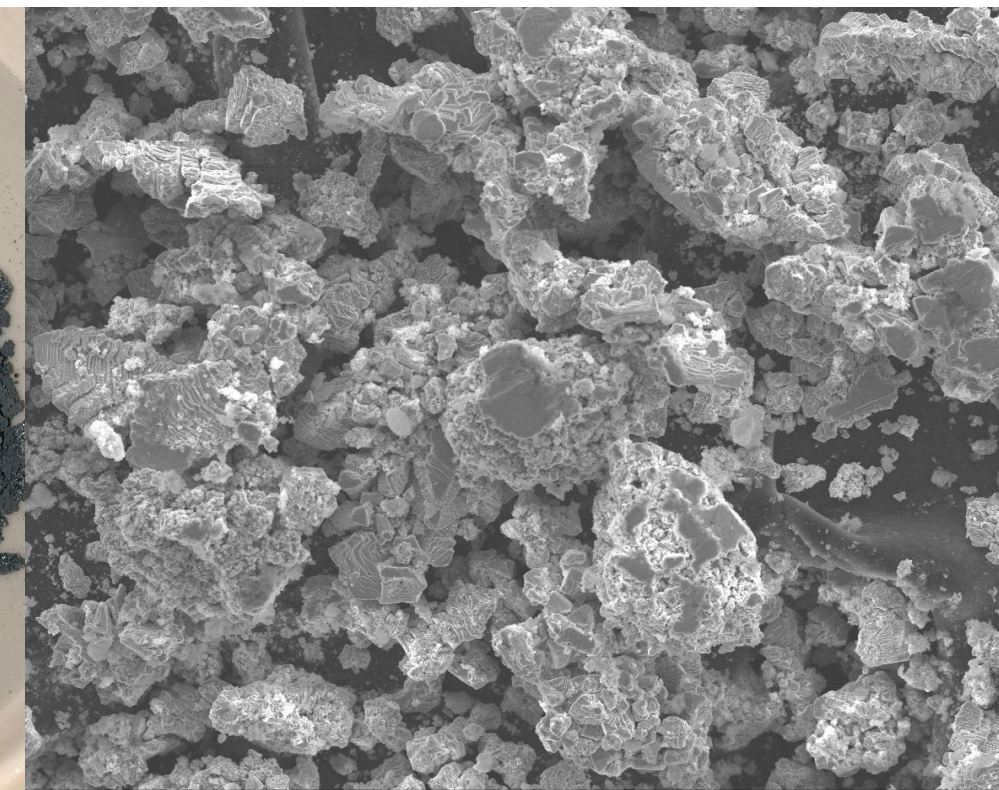
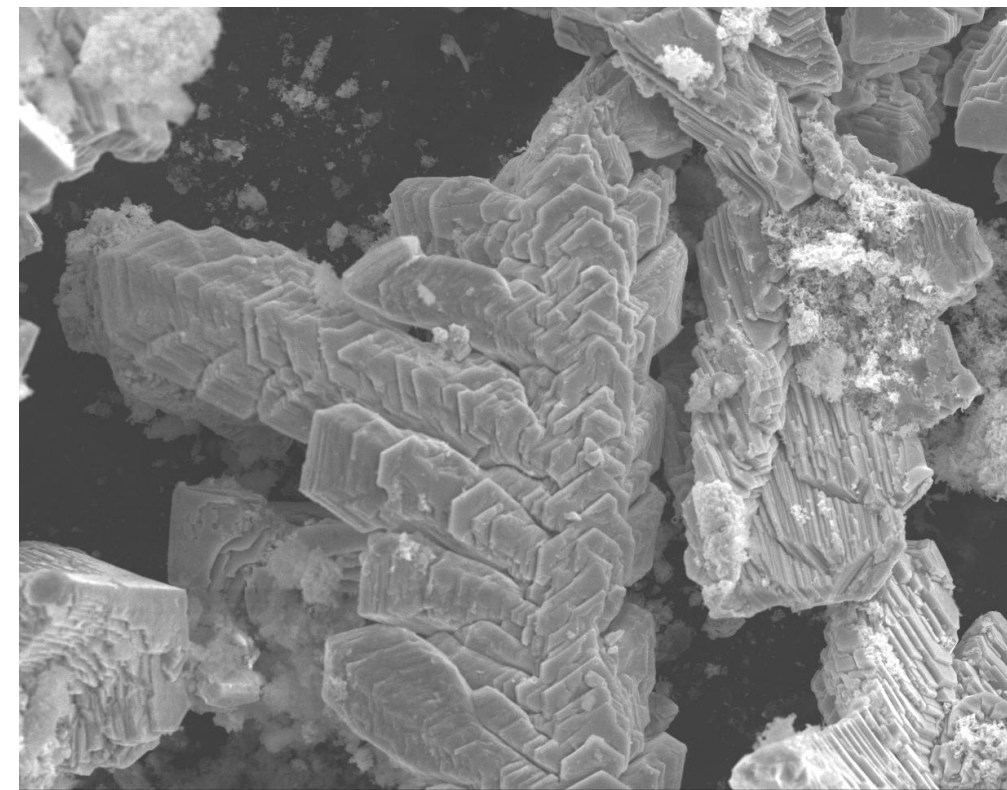


**Одноразовые электронные
сигареты**

Однократное использование -
контроль качества
аккумулятора



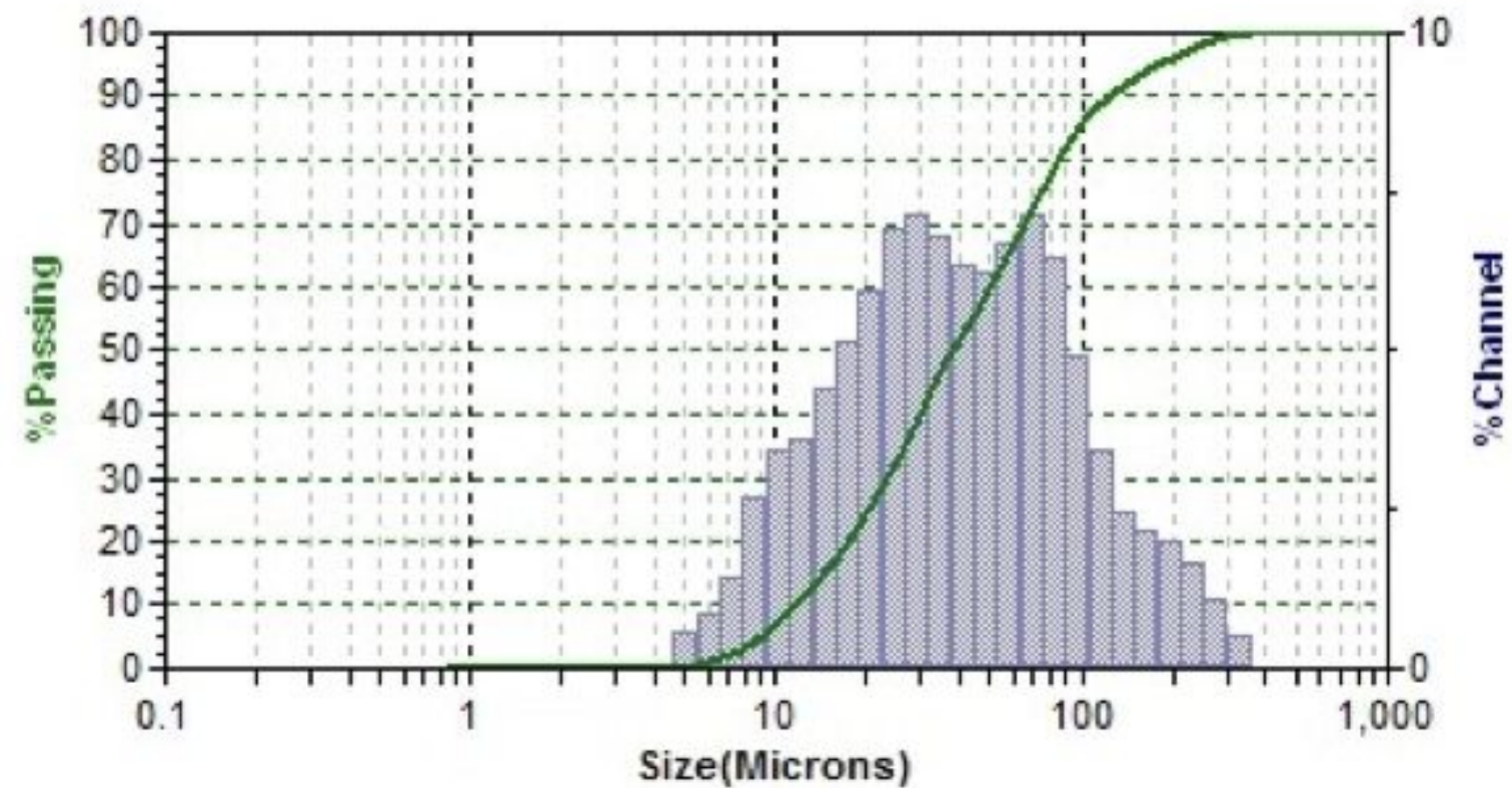
3R - RECYCLE



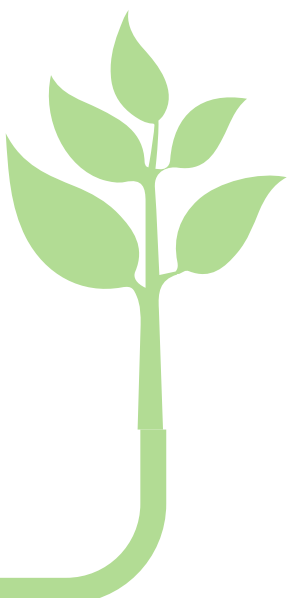
X 1,000 20.0kV SEI SEM 10µm JEOL 4/20/2019 WD 10mm 15:12:12

X 200 20.0kV SEI SEM 100µm JEOL 4/20/2019 WD 10mm 15:11:05

Рециклинг чёрных металлов



Утилизация - употребление с пользой



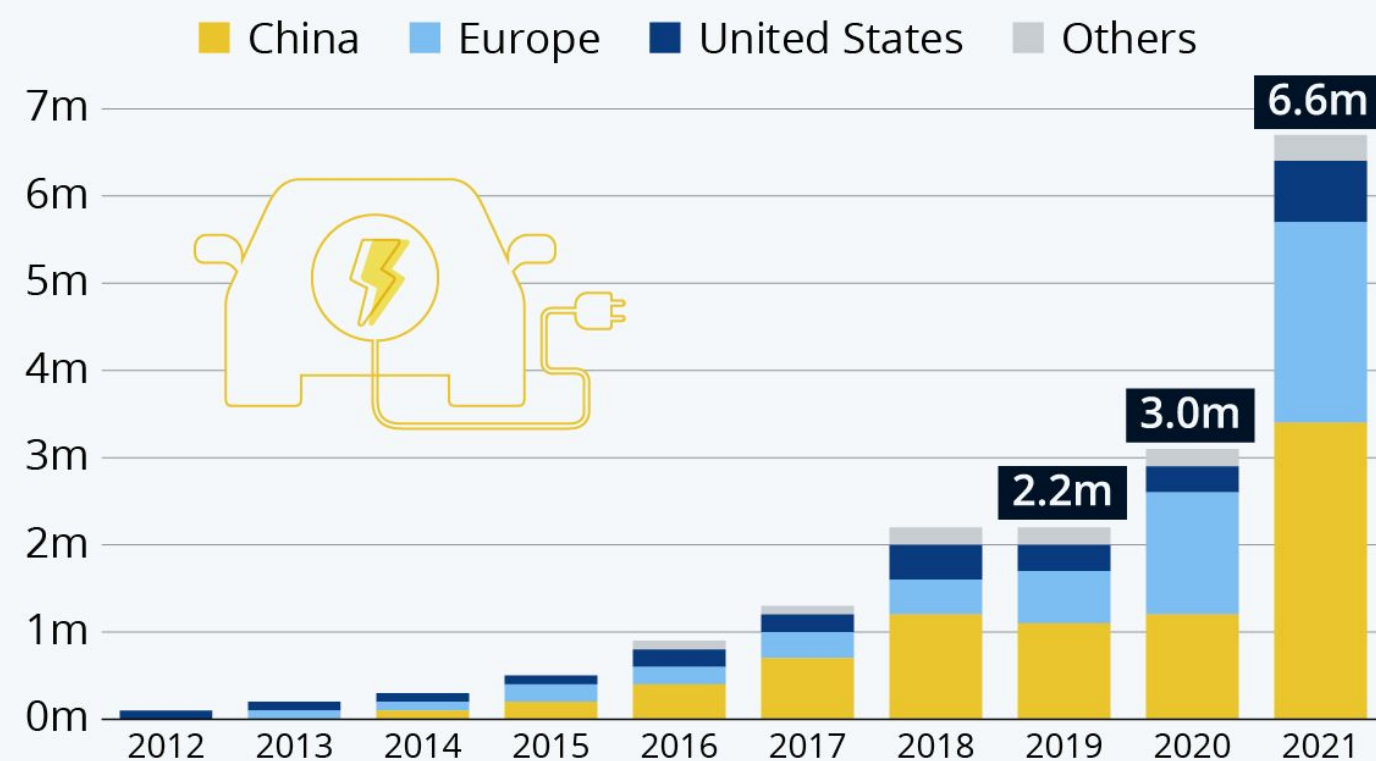
Техногенное сырье вчера



Техногенное сырьё сегодня

Global Electric Car Sales Doubled in 2021

Global registrations of electric vehicles (incl. plug-in hybrids), by region*



* incl. passenger cars and light commercial vehicles (vans, light trucks)

Source: EV-volumes.com via IEA



statista

В 2015 году в России продано менее 116 электромобилей, из которых 52 - Tesla



В 2021 году мировое потребление кобальта в области автомобилестроения превысило потребление мобильной электроникой и смартфонами



Техногенное сырье завтра



ДИНАМИКА ПЕРЕРАБОТКИ КРУПНЫХ LI-ION АКБ ОТ EVS



2020

400 кг

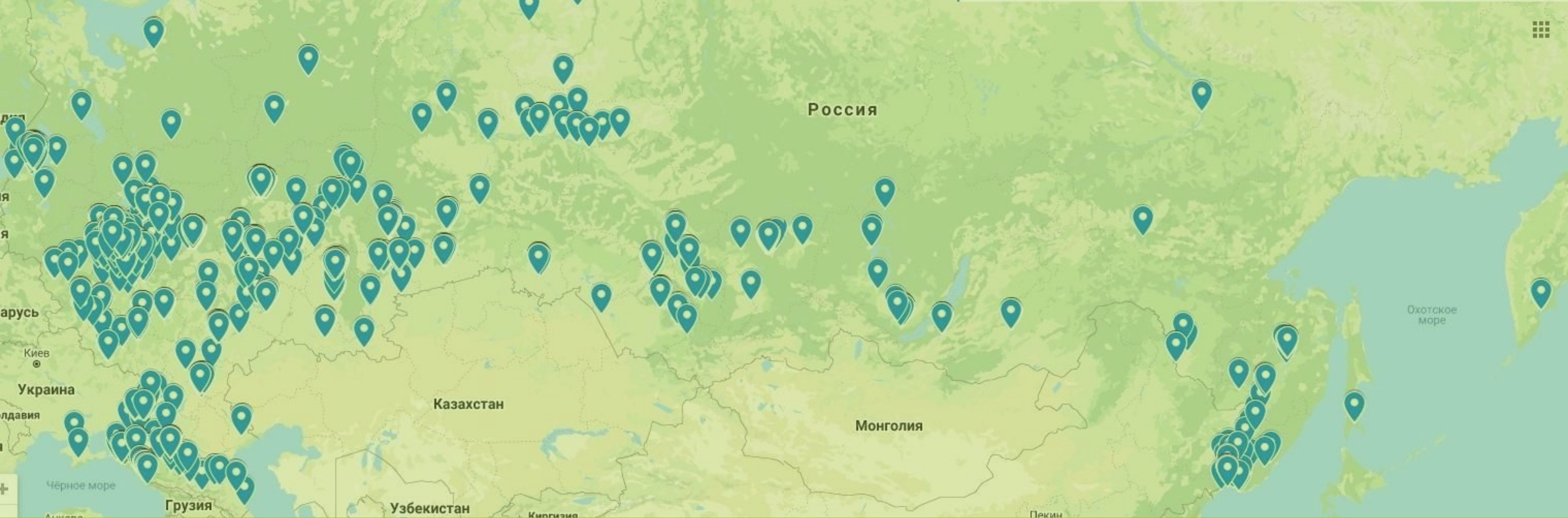
2021

1900 кг

2022

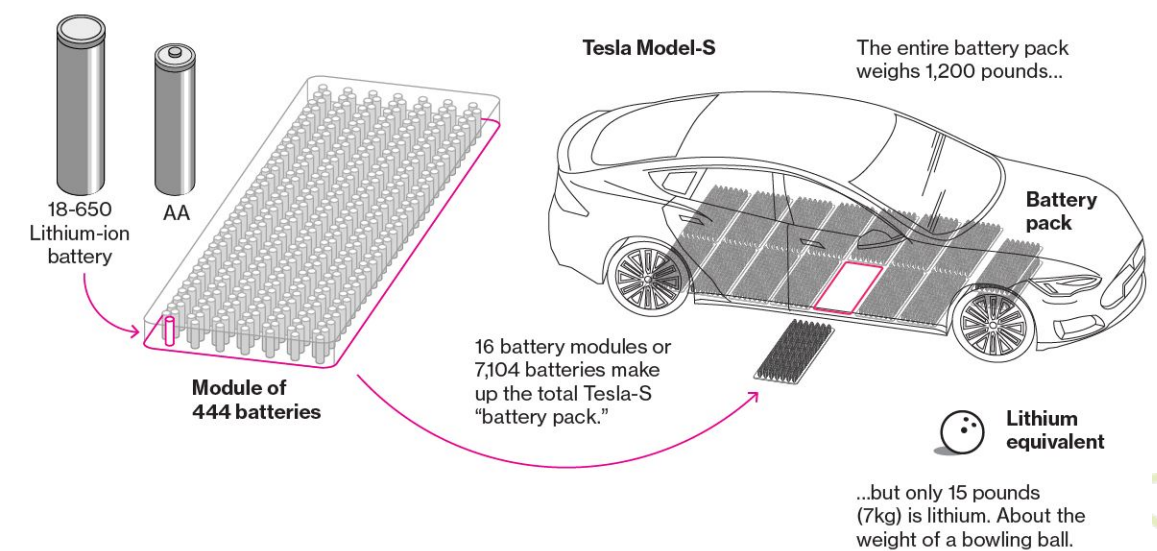
12 000 кг





КАРТА ПУНКТОВ ПРИЕМА МЕЛКИХ И СРЕДНИХ АККУМУЛЯТОРОВ

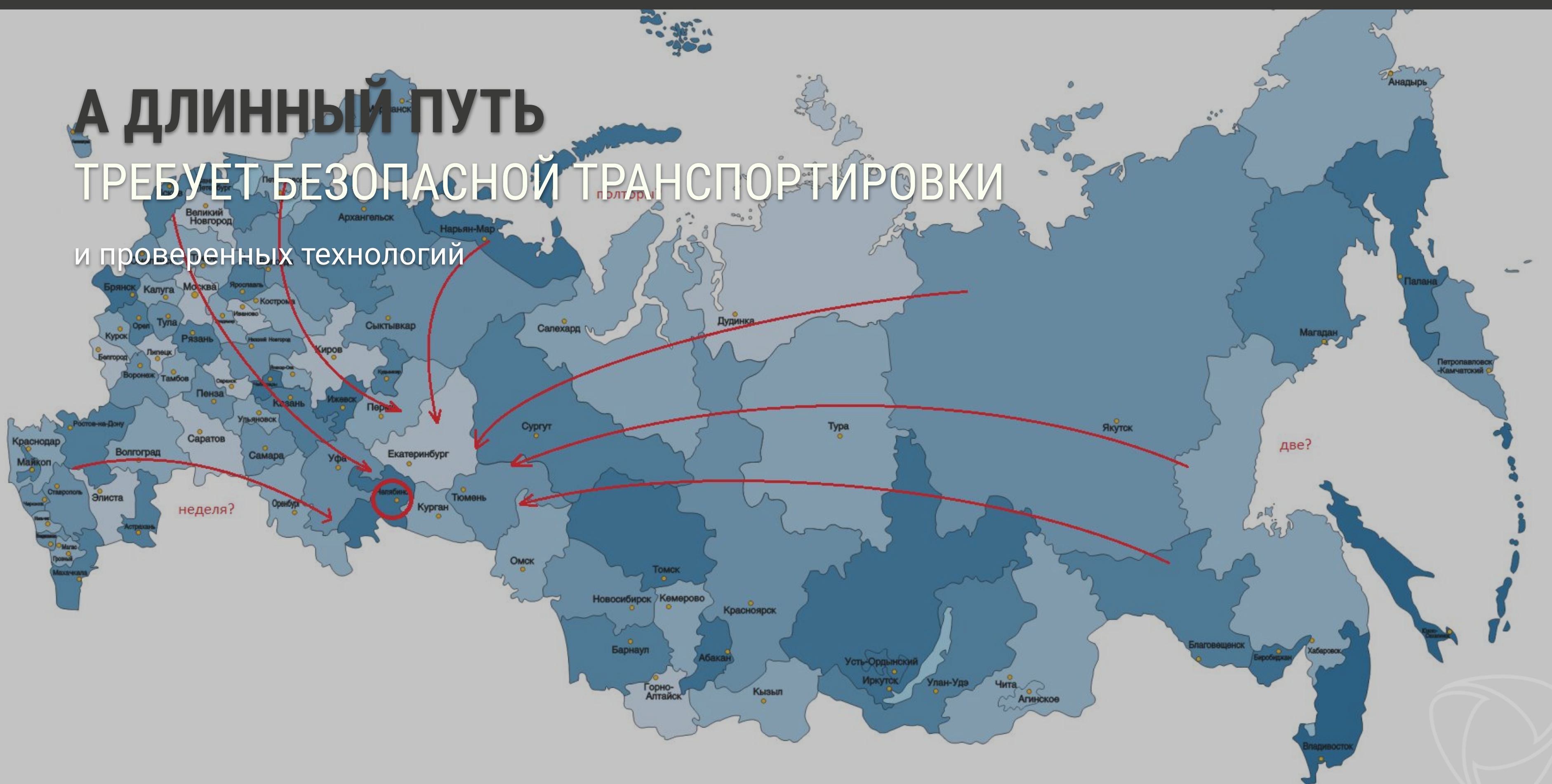
Сборка в Tesla от 7104 до 4416 штук (18650 и 21700)



b2b partnership for customers

А ДЛИННЫЙ ПУТЬ ТРЕБУЕТ БЕЗОПАСНОЙ ТРАНСПОРТИРОВКИ

и проверенных технологий



ТРАНСПОРТИРОВКА, УПАКОВКА, ХРАНЕНИЕ И УТИЛИЗАЦИЯ LI-ION АККУМУЛЯТОРОВ



может и должна осуществляться только в
специализированных контейнерах,
соответствующих международным отраслевым
стандартам и действующему транспортному
законодательству



ТРАНСПОРТИРОВКА И УПАКОВКА

ИЗ СОПРОВОДИТЕЛЬНЫХ ДОКУМЕНТОВ

The transport of dangerous goods is only allowed in approved and appropriate packaging



Requirements for the packaging of dangerous goods

- Transport stability
- Resistance against inner pressures
- Chemical durability
- When filling packaging with liquids, a sufficient space must be left free
- Free of damages and leak proofed
- Packaging must be free of adhesions
- Effective locks / caps
- Packaging must be approved for the respective substance
- Type approved outer packaging

Different Types of packaging

Single Packaging

- Barrels
- Cans
- Gas bottles
- Boxes

IBC

- IBCs out of metal
- Flexible IBCs
- Combined IBCs

Containers, tanks & vehicles

- Standard containers
- Bulk containers
- Tank vehicles

How to find out the right packing regulation

Applicable packaging for packing dangerous goods are defined in table 3.2 column 8, 9a and 9b in the ADR

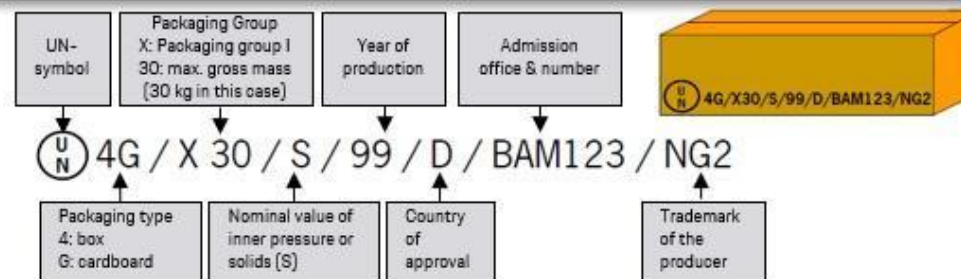
Example: The transport of petrol

UN-No.	Name	Class	Class. Code	Packing group	Labels	Special provision	Limited and excepted quantities	Packaging			
1	2	3a	3b	4	5	6	7a	7b	8	9a	9b
1203	Petrol	3	F1	II	3	243 534 664	1L E2		P001 IBC02 R001	PP5 BB2	MP19

P001: General packing instruction for liquid substances
 IBC02: Packing instruction for the usage of IBC
 R001: Packing instructions for light-gauge metal packaging

Coding of a packaging for dangerous goods

Type approved packaging are marked with a so-called UN-specification. This UN-Code contains information about the type and performance of the packaging and proves that the packaging is tested based on the criteria of the UN recommendation and approved for the transport of dangerous goods. A basic part of the UN-Specification is the coding of the packaging group.



Overview about the packaging of Lithium-Ion Batteries



provides two different types of packaging, which are approved within the **ADR-countries** according international UN-Regulations for transport of normal and warning lithium-ion batteries.

In **non-ADR countries**, the importers and subsidiaries need to approve these packaging by the competent authorities of transporting dangerous goods.

The packaging of Li-Ion batteries depends mainly on the status of the respective battery.

Packaging of normal Li-Ion Batteries

- Even Undamaged normal Li-Ion Batteries should be transported in an original spare part packaging.
- The reason for that is that the packaging must be type-approved (See topic 6: UN-Coding for packaging). UN-approved packaging is intended to provide safety during transportation which will be ensured by several testing procedures such as a drop test or stack compression test.
- These packaging are available by the standard original spare parts process via PET and can be ordered from the importer / subsidiary if necessary.

Packaging of warning Li-Ion Batteries

- Critical Li-Ion Batteries must be packed in a rigid outer metal packaging (Lion-Guard box) embedded with special hollow glass granules (Pyrobubbles).
- The external packaging must ensure that in case of fire or thermal runaway of the damaged Li-Ion Battery the temperature of 100°C on the outside is not exceeded, no flames or projectiles get outside the packaging and the packaging remains structurally intact.
- Pyrobubbles play a key role in this aspect as they serve as a non-conductive and non-combustible absorbent and as a shock and heat insulating material.

- In practice* see handbook**
1. Check if an undamaged package is available in the [redacted]. If not → step no. 2; if yes → step no. 3 (Note: In case of a traction battery, which is going to change, the package of the delivered, new battery can be used for packing)
 2. Order an approved package from the contracted recycling company
 3. Prepare the battery for packing according to the package
 4. Pack the battery in the package according to the package
 5. Mark and label the package accordingly

- Note:** Only a HVT is qualified to put a warning battery into the package. (Exception: HV battery with an isolation error needs to be handled by a HVE.)
- In practice* see handbook**
1. Ordering a metal box from the contracted recycling company
 2. Make a visual inspection of the delivered special package
If damaged metal-box → step no. 1; if undamaged box → step no. 3
 3. Prepare the battery for packing according to packing method
 4. Pack the battery in the package according to packing
 5. Mark and label the package accordingly

* While every care has been taken to ensure the accuracy of this information, VAB4 cannot take any responsibility or warranty for any errors or omissions. If you find any errors or incorrect information in this document, please let us know. Thank you!

МЕГАПОЛИС  **РЕСУРС**
the people behind this company group



Спасибо за внимание

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8-800-1000-326

