



HYBUILD project in a nutshell

**Carmine Pascale, G. Zsembinszki, M. Morata, R. Decorme, C. Barrère
A. Frazzica, V. Palomba, J. Emhofer, T. Barz, L.F. Cabeza**
STRESS, University of Lleida, COMSA, CNR ITAE, AIT, R2M Solution

HYBUILD

INNOVATIVE COMPACT HYBRID ELECTRICAL/THERMAL STORAGE SYSTEM
FOR LOW ENERGY BUILDINGS

9th ECTP Conference

Parallel Session - Embracing B4P Partnership: The transition from
energy efficient buildings to a sustainable built environment
Madrid, Spain



0 Outline

1. **HYBUILD in a nutshell**
2. **Overall concept**
3. **Implementation**
4. **Transition from energy efficient buildings to a sustainable built environment**
5. **Impact: key figures**
6. **Conclusions**

1 HYBUILD in a nutshell

- Project type: RIA
- Project start: **10/2017**
- Project end: **03/2022**
- Overall EU contribution: **5,995,840 €**
- Consortium: **20 partners, 9 countries**
- Coordinator: COMSA



Kick-off meeting Brussels - 10/2017

ECTP Membership in the project (current or past)

www.hybuild.eu

1 HYBUILD in a nutshell

- HYBUILD aims to develop **two innovative hybrid storage concepts**
 1. For **Mediterranean climate** primarily for **cooling energy** supply
 2. For **Continental climate** primarily meant for **heating and DHW** supply
- The concepts are based on innovative components such as:

DC-powered
reversible HP



DC bus
generator



Compact sorption
module

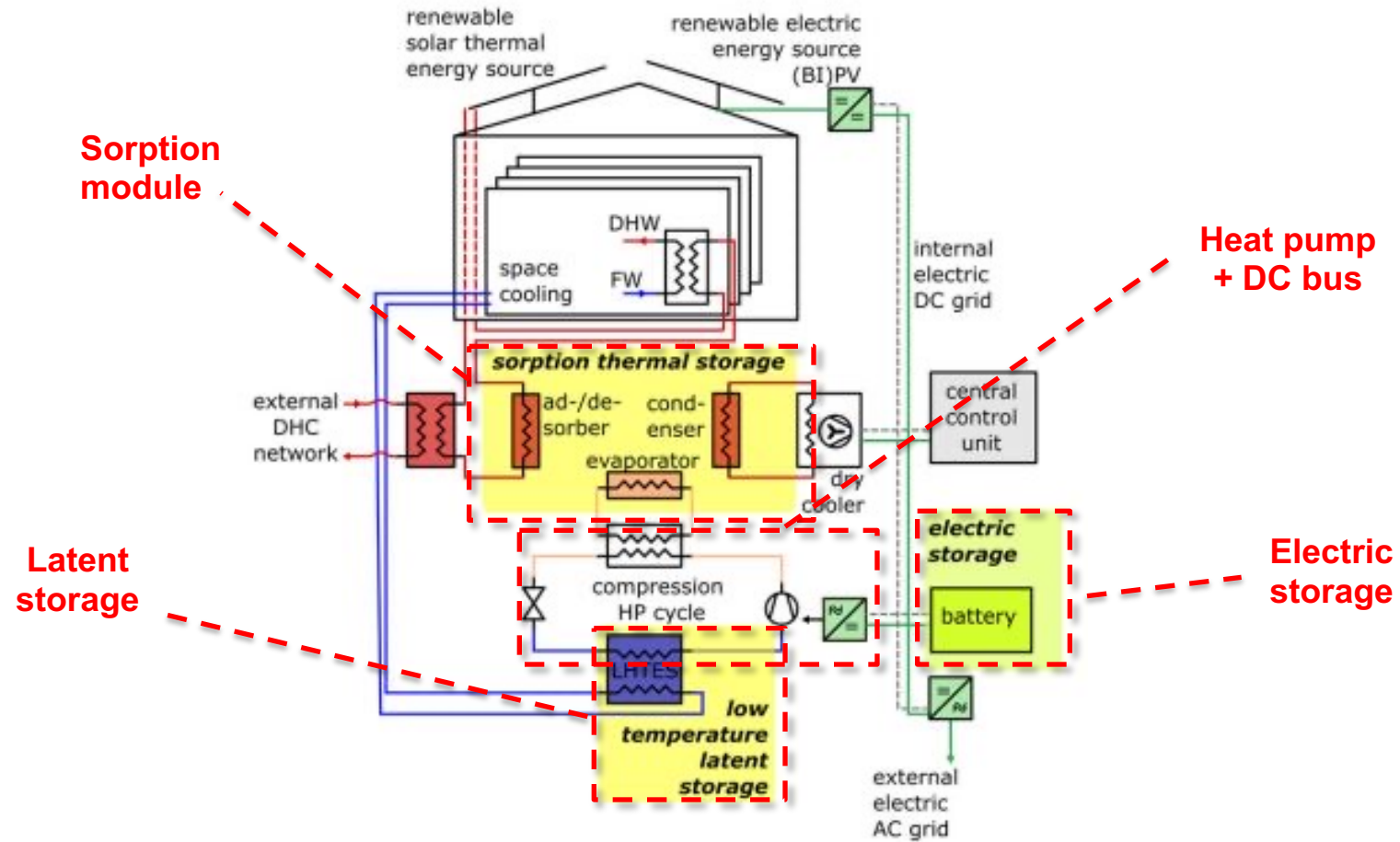


High-density
latent storage



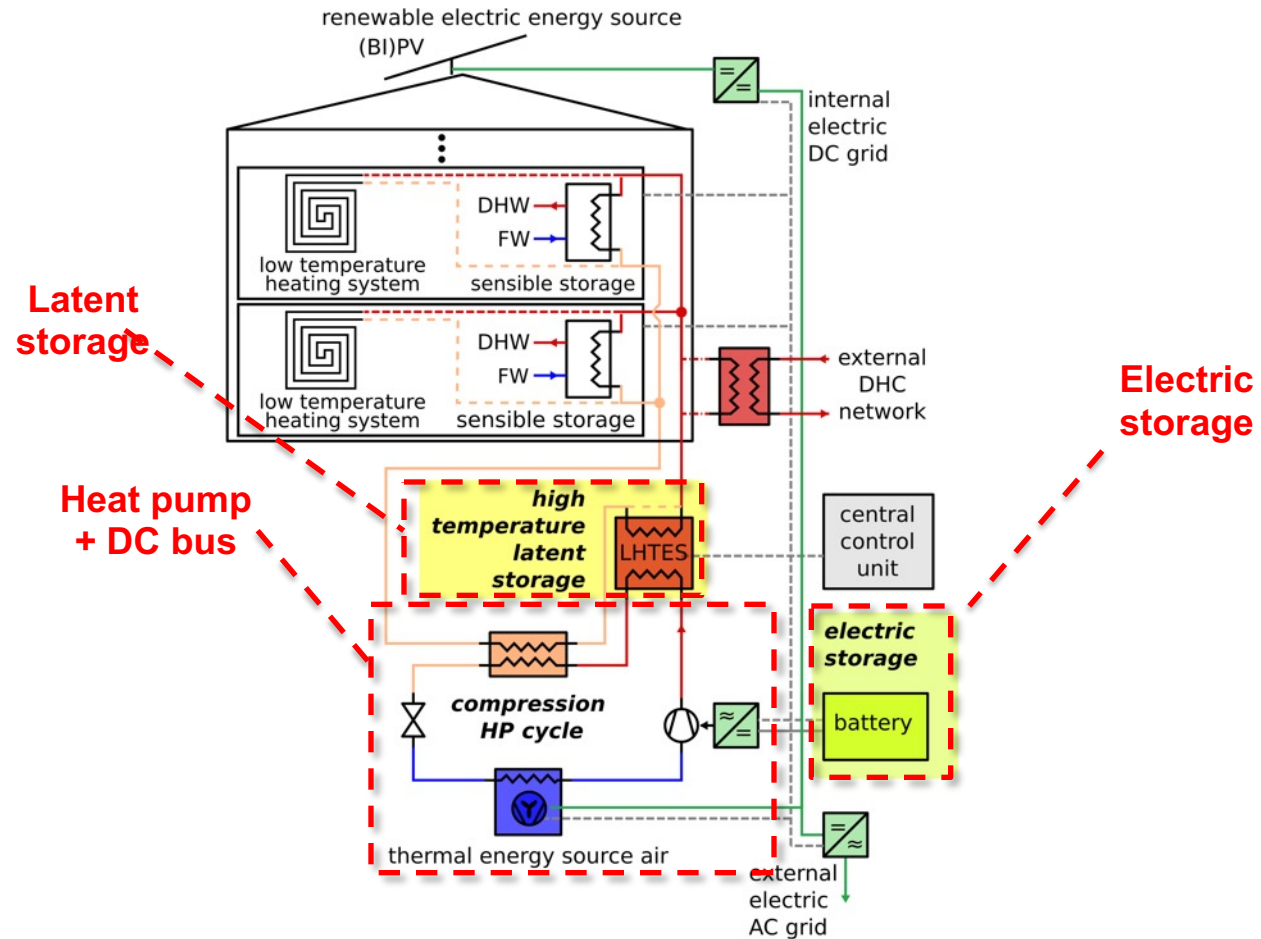
2 Overall concept

Mediterranean system (main focus on cooling)



2 Overall concept

Continental system (main focus on heating & DHW)

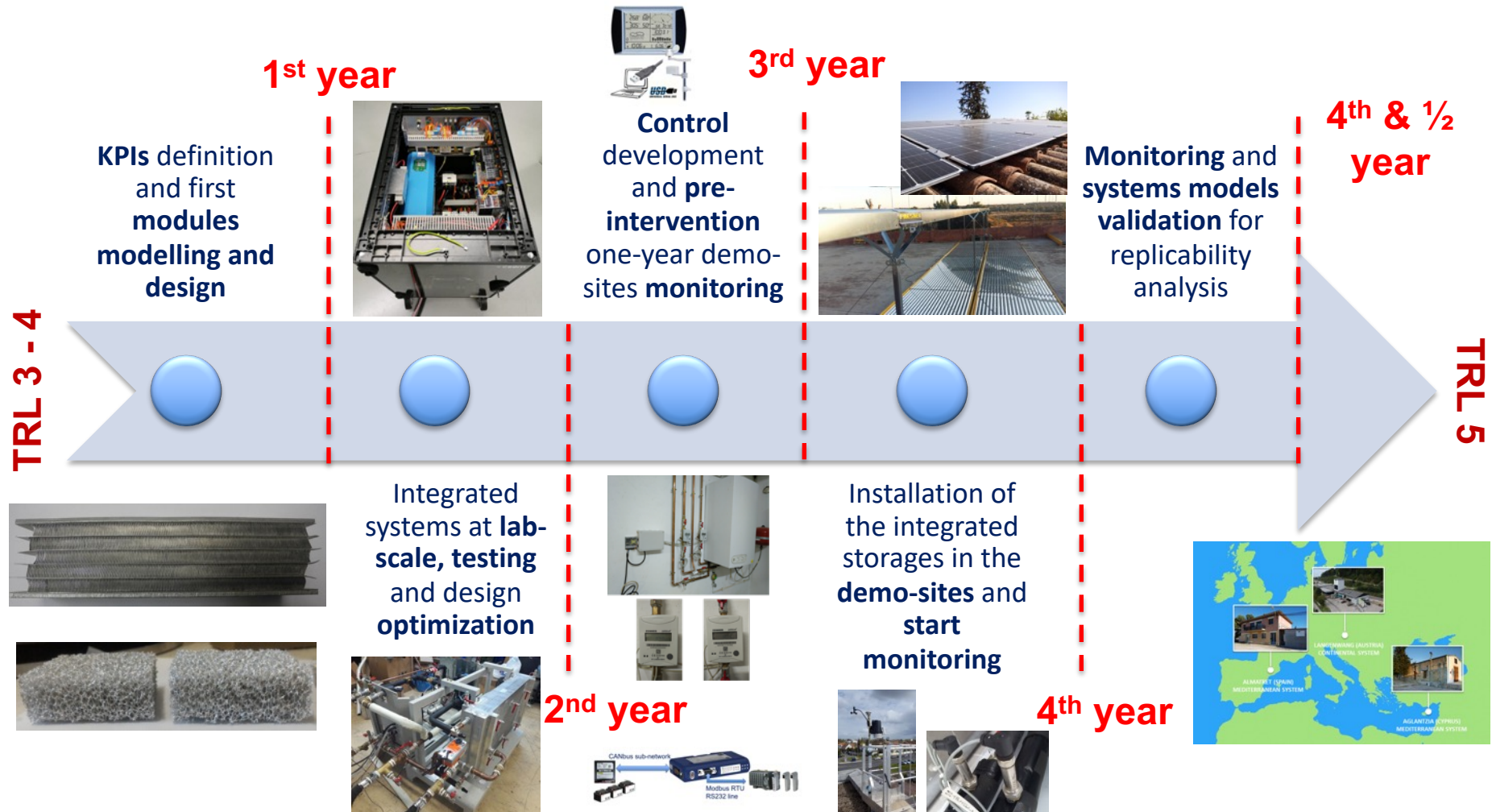


2 Overall concept

- The systems will be properly managed by **advanced control and Building Energy Management Systems (BEMS)**
- The systems are **tested in three different demo-sites**

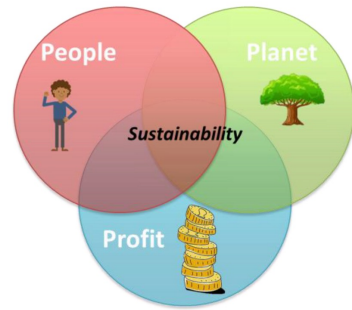


3 Implementation

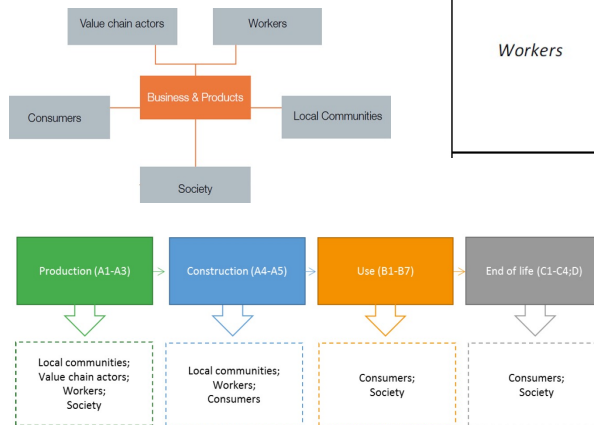
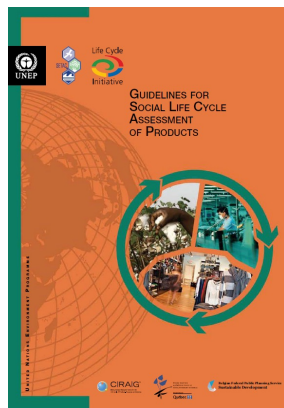


4 Transition from energy efficient buildings to a sustainable built environment

The systems have been analyzed through an holistic approach including environmental and economic evaluation but also a specific Social Life-Cycle Assessment



The S-LCA is a methodology allowing to analyze social and socio-economic aspects, associated with a product (or service), and to evaluate the potential impacts during the entire life cycle*.



| | |
|---------------------------------|--|
| Workers | Freedom of association & collective bargaining |
| | Child labour |
| | Fair salary |
| | Working hours |
| | Forced labour |
| | Equal opportunities/discrimination |
| | Health and safety |
| Social benefits/social security | |

| Subcategories and Impact Categories | |
|-------------------------------------|--|
| - | no impacts |
| ✓ | strong relationship between subcategory and impact category (HIGH IMPACT- positive and negative) |
| (✓) | weak relationship between subcategory and impact category (LOW IMPACT- positive And negative) |

| Stakeholder | Subcategory | PA | WC | HS | HR | SER | IR | G | IA |
|-------------|--|----|------|----|----|-----|-----|-----|------|
| Workers | Freedom of association and collective bargaining | 2 | ✓ | ✓ | ✓ | ✓ | (✓) | (✓) | 1 |
| | Child labour | 1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 1 |
| | Discrimination | 5 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6 |
| | Amount | | 4.00 | | | | | | 5.00 |

| Performance assessment | Impact assessment | Colour | Factor |
|--------------------------|-------------------------|-------------|--------|
| Very good performance | Positive effect | Green | 1 |
| Good performance | Lightly positive effect | Light Green | 2 |
| Satisfactory performance | Indifferent effect | Yellow | 3 |
| Inadequate performance | Lightly negative effect | Orange | 4 |
| Poor performance | Negative effect | Red | 5 |
| Very poor performance | Very negative effect | Dark Red | 6 |

*UNEP/SETAC guidelines: "Guidelines for Social Life Cycle Assessment of products", 2009

4 Transition from energy efficient buildings to a sustainable built environment

Regulatory and regulation issues have been taken into account

Standardization activities will be key for the future exploitation of the technologies developed in the project.

Technical Committees, related with the technologies developed in the project, have been identified and existing standards have been analyzed.

Specific standardization proposals will be prepared for selected components

5 Impact: key figures

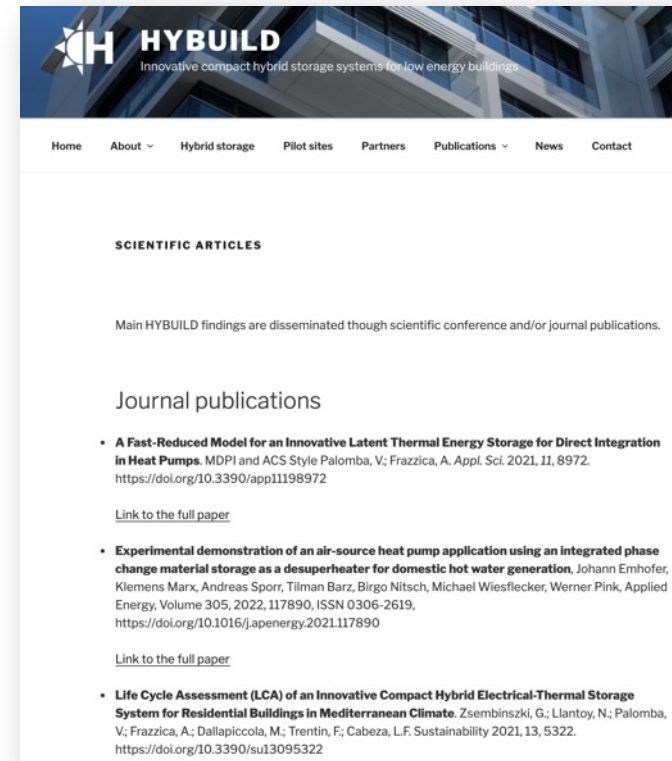
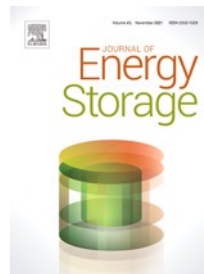
HYBUILD is a relatively **low-TRL** EeB project

Start TRL**4**  End TRL**6**

Key scientific impacts:

19 papers submitted
in high impact-factor journals

(**18** already published)



Find them here: <http://www.hybuild.eu/publications/scientific-articles>

And on OpenAire 

5 Impact: key figures

Key scientific impacts:

14 conference papers published

Grown a strong **community of EU sister-projects** around RHC for buildings:
Joint publications, collaboration on horizontal topics, etc.

2020 – 15 projects



2021 – 21 projects

5 Impact: key figures

Key exploitation impacts:

2 patents | related to PCM-heat exchangers

9 KERs (Key Exploitable Results)

3 of them uploaded on the Horizon Results platform



Innovative adsorber: Adsorption Heat exchanger with high surface area
 HYBUILD - Innovative compact Hybrid electrical/thermal storage systems for low energy BUILDings

- We need
 - We are sharing our knowledge
- 3 contributors
- Sectors
 - Climate action
 - Energy
 - Research and innovation
- Result Maturity
 - 6 - Demonstration - System Launch and Operations (TRL 6-9)
- We have
 - IPR

Sustainable Development Goals: 7 (Renewable Energy), 9 (Industry, Innovation and Infrastructure), 13 (Climate Action)

PCM (Phase Change Material) thermal storage module for HVAC applications
 HYBUILD - Innovative compact Hybrid electrical/thermal storage systems for low energy BUILDings

- We need
 - We are sharing our knowledge
- 3 contributors
- Sectors
 - Energy
 - Environment
 - Research and innovation
- Result Maturity
 - 6 - Demonstration - System Launch and Operations (TRL 6-9)
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Sustainable Development Goals: 7 (Renewable Energy), 9 (Industry, Innovation and Infrastructure), 13 (Climate Action)

Adapted stainless-steel water storage
 HYBUILD - Innovative compact Hybrid electrical/thermal storage systems for low energy BUILDings

- We need
 - Expanding to more markets /finding new customers
- 1 contributor
- Sectors
 - Climate action
 - Energy
 - Research and innovation
- Result Maturity
 - 5 - Demonstration - System Development (TRL 4-6)
- We have
 - IPR

Sustainable Development Goals: 3 (Good Health and Well-being), 11 (Sustainable Cities and Communities), 13 (Climate Action)

5 Impact: key figures

Key exploitation impacts:

HYBUILD overall system (Med & Cont)

further research required – opportunities through Horizon Europe and National R&D programmes (already 1 R&D project funded by Austria FFG with several HYBUILD partners engaged to continue part of the developments)



HYBUILD sub-systems / individual components

1 KER shall be ready for commercialization at the end of the project.
For 2 other KERs, TRL9 foreseen by 2-3 years.

6 Conclusions

- HYBUILD project develops innovative fully-integrated components for hybrid electric/thermal storage solutions at domestic level
- The developed solutions were optimized for both heating and cooling applications. Three demo sites have been used to validate the solutions
- The full-scale systems were successfully tested under lab-controlled conditions but the partnership agrees that further research is needed for full market exploitation of the entire systems
- Market exploitation of the entire system requires specific Business models to be developed among the entire partnership, single exploitable results are already mature for market exploitation



THANK YOU



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