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# FRAUNHOFER INSTITUTE FOR SOLAR ENERGY SYSTEMS ISE

## Agrophotovoltaics in open farming areas: Results from the APV-RESOLA-Project

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Stephan Schindele  
Fraunhofer ISE

Agrovoltaics in  
France and Germany  
OFATE DFVEW Seminar

Paris, 12.10.2018

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# AGENDA

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- Results
- Transfer of Results

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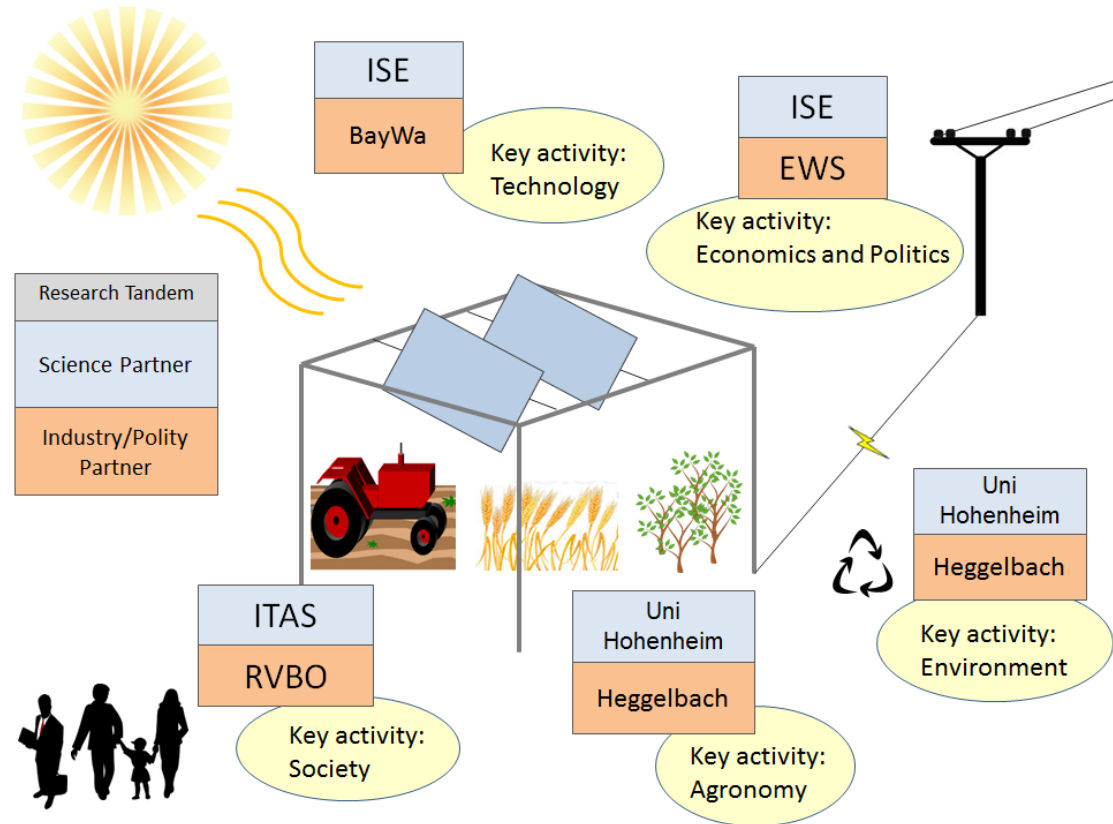
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- **Results**
  - **Basic Information**
  - **Results of Key Activities**
- **Transfer of Results**

# Basic information APV-RESOLA-Project

## Who we are and How we work together

- 5 Key activities
- 5 Research tandems
- 1 Innovation Group
- Funding:
  - BMBF: €2,8 Mio.
  - Industry: € 0,4 Mio
- Duration:
  - Kick-off: March 2015
  - End: December 2019
- RESOLA = resource-efficient land-use
- Southern Germany / Lake Constance



Source: University of Hohenheim

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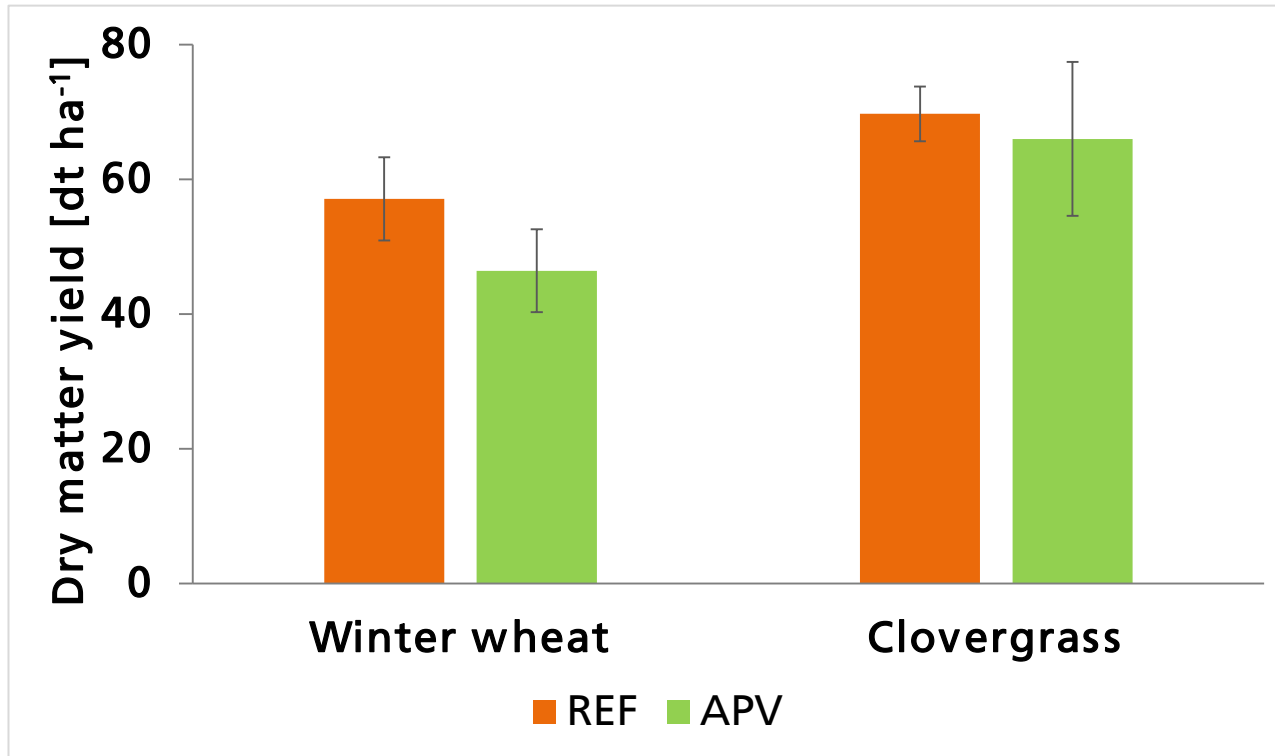
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# Results: Key Activity Agronomy

## First Harvest in 2017: Winter Wheat and Clovergrass



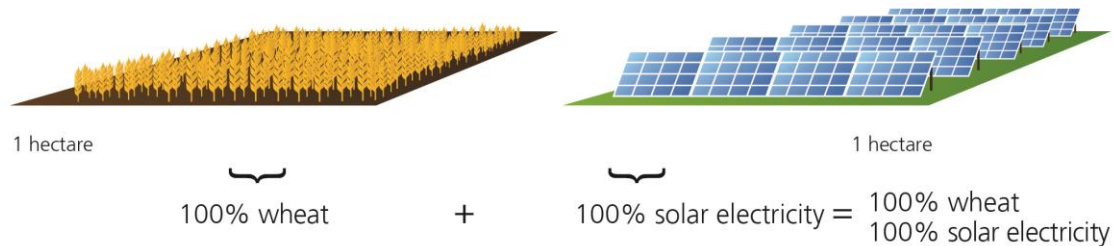
Source:  
University of Hohenheim

- Winter wheat: yield reduction by 19 % under APV
- Clovergrass: yield reduction by 5 % under APV (4 cuts)

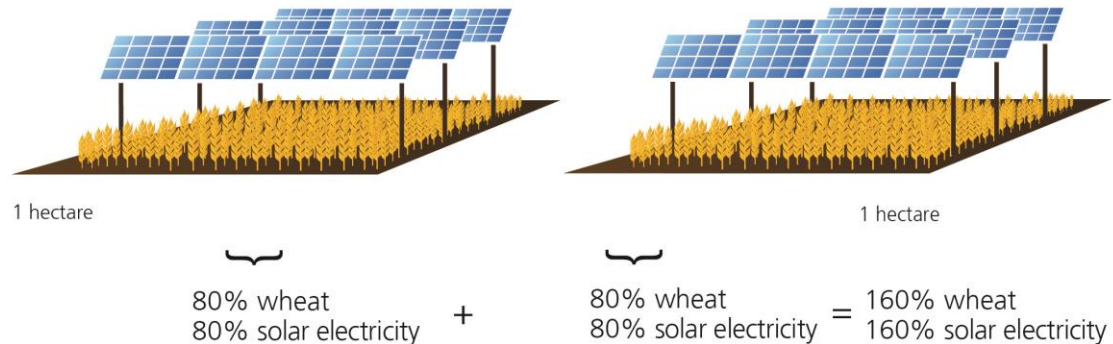
# Results: Key Activity Agronomy and Technology

## Increase of Land-use Efficiency by over 60 %

### Separate Land Use on 2 Hectare Cropland



### Combined Land Use on 2 Hectare Cropland: Efficiency increases over 60%



Source: Fraunhofer ISE, University of Hohenheim

- PV-cropping is feasible and synergies generate additional income for farmers

# Results: Key Activity Society

## Two Active Involvements of Citizens and one Survey

- Consensus regards PV utilization:
  - Priority on roof top, parking and industrial PV
  - On arable land preference for APV over conventional PV-GM
- PV/APV higher preference than Wind and Biogas
- Learning from (negative) Biogas experience:
  - Avoiding uncontrolled growth in rural areas
  - Avoiding „Pseudo-Farming“
- Demand for landscape integrated APV implementation
  - Size and concentration shall be limited
  - Supply and demand shall be matched





# Results: Key Activity Economics and Politics

## APV-Potential in Germany

### Theoretical Potential: Arable Land Area

13.5 Mio. ha

6.900 GWp

### Technical Potential: Categories +/-0

> 2,0 Mio. ha

1.040 GWp

### Feasible Potential: 8 – 10 % of Technical Potential

0,16 – 0,3 Mio. Ha

83 – 156 GWp

Source: Fraunhofer ISE

- 0,3 Mio. ha = 2,2 % of arable land area
- Current technical PV-Potential in Germany: approx. 200 GWp

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# Thank you very much for your attention!

## Save-the-Date: 06. May 2019 / APV-Workshop in Berlin



Stephan Schindele, Fraunhofer ISE

APV-RESOLA is a joint project of:



[stephan.schindele@ise.fraunhofer.de](mailto:stephan.schindele@ise.fraunhofer.de)

[www.agrophotovoltaik.de](http://www.agrophotovoltaik.de)

[www.ise.fraunhofer.de](http://www.ise.fraunhofer.de)