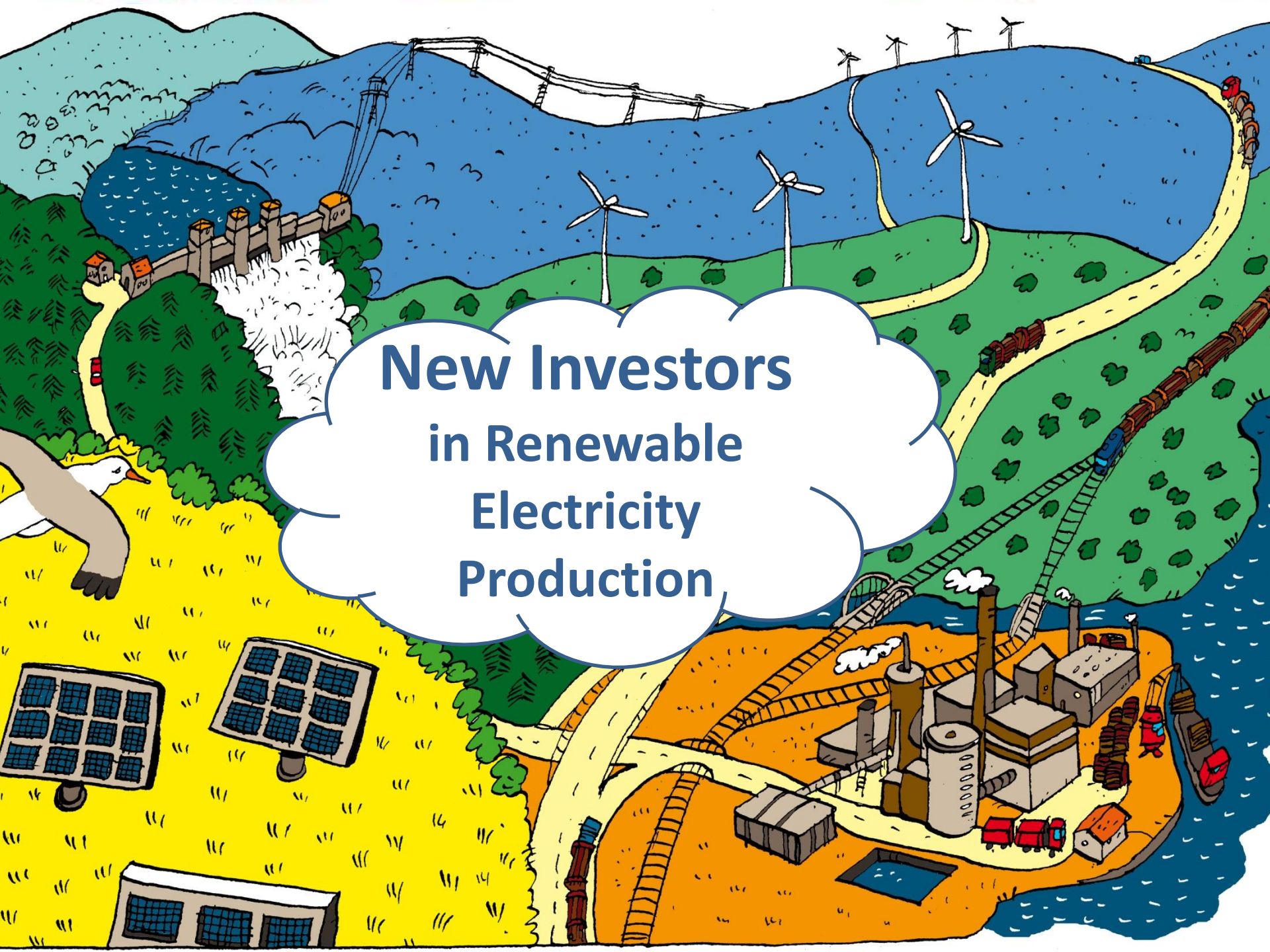

New Investors
in Renewable
Electricity
Production

Background

- Large investments in renewable electricity (RES-E) production are needed to transform the (Swedish) energy system.
- Who will make these investments and what type of policies and decision support systems are needed to stimulate and support different types of investors?

What do we know about investors in RES-E from previous literature?

- Neoclassical economics & energy economics:

  "The combined cycle (CCGT) possesses ... many of the characteristics suitable in times of deregulation and slow demand growth. Most importantly, low capital cost, short lead times, and the possibility of adding small capacity increments, enable power producers to follow demand developments more closely, and reduce uncertainties and costs ... The above motivates the use of gas-fired power as a benchmark towards which the economics of wind power can be assessed." (Söderholm et al., 2007)

- Empirical mapping of investors in RES-E:
  - Other types of investors than utilities and municipal energy companies invest in RES-E plants.
  - Non-traditional investors probably differ from traditional ones (but no empirical studies of this)

What do we think differs between traditional and new investor types?

- Motives & driving forces
- Available resources (including knowledge and experiences)
- Investment criteria (e.g. ROI requirements, alternative investments)
- Interest and ability to participate in/contribute to technology development

Research aims

- Identify and categorise investors in RES-E plants in Sweden
- Characterise categories in terms of motives, resources, investment criteria and interest/ability to contribute to technology development.
- Compare categories and characteristics of investors in Sweden with those of another country.
- Identify implications for design and implementation of policies to stimulate investments in RES-E and development of RET.
- *Implement knowledge about investment criteria in existing investment decision support models.*

Project team

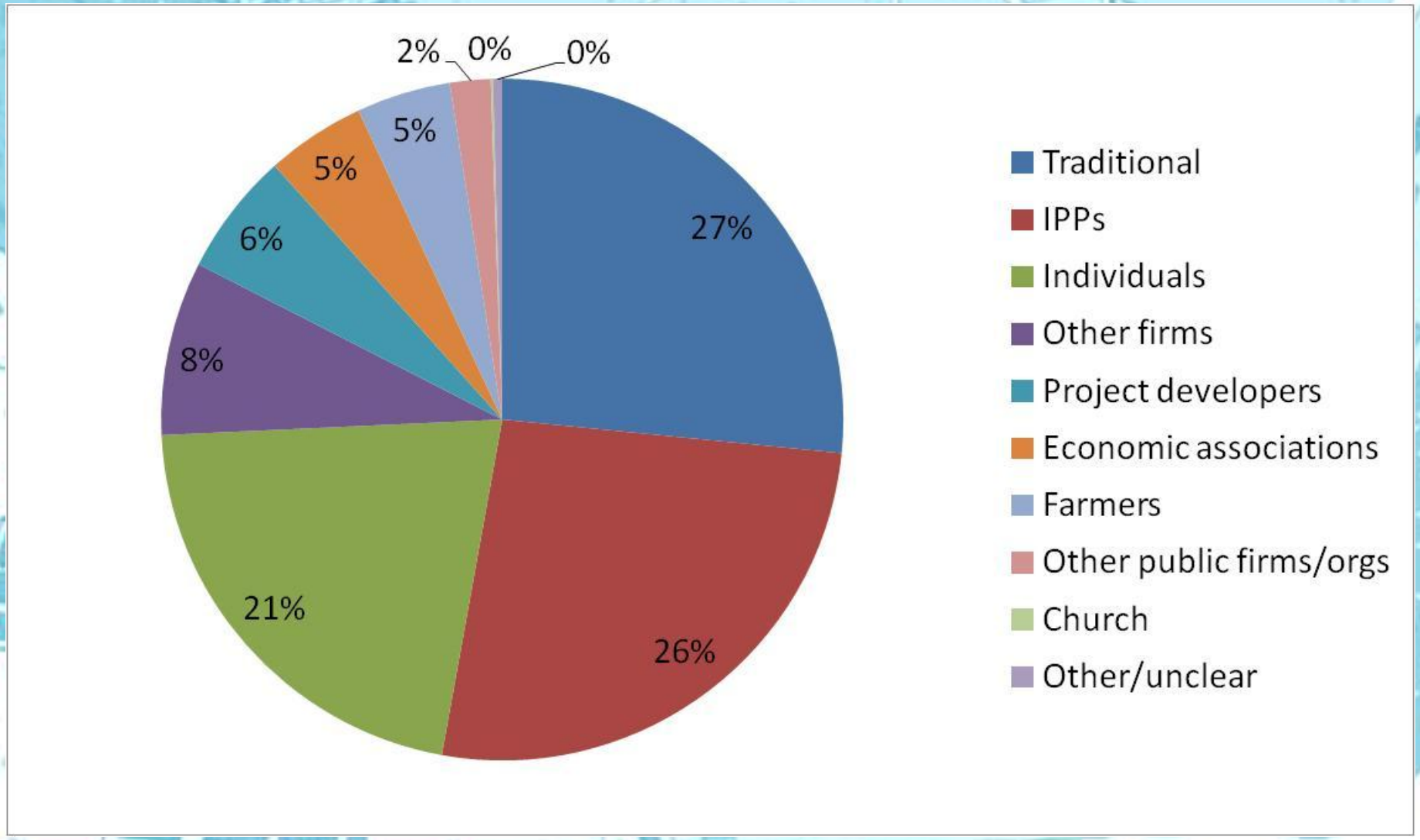
- Division of Project, Entrepreneurship and Innovation – motives, investment criteria and policy implications
  - Gunnel Sundberg, Assistant professor, project leader
  - Anna Bergek, Associate Professor
  - PhD student: Ingrid Mignon Johansson (from 1 August)
- Division of Energy Systems – optimization-based investment decision support models and policy implications
  - Mats Söderström, Associate Professor
  - PhD student: vacant

Investor categories in Sweden

Data from the Swedish electricity certificate system (July 2011)

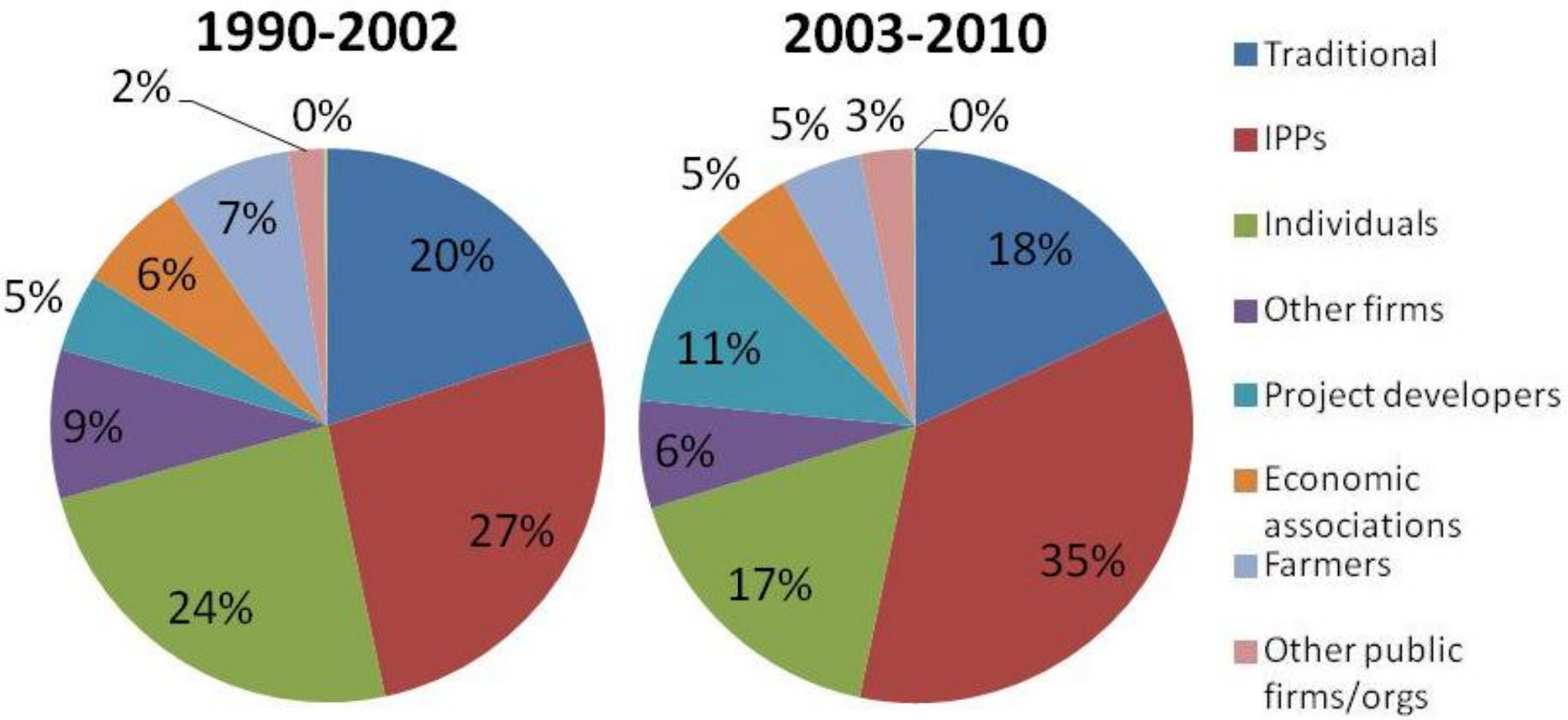
Investor categories

(share of total number of plants in the system in July 2011)

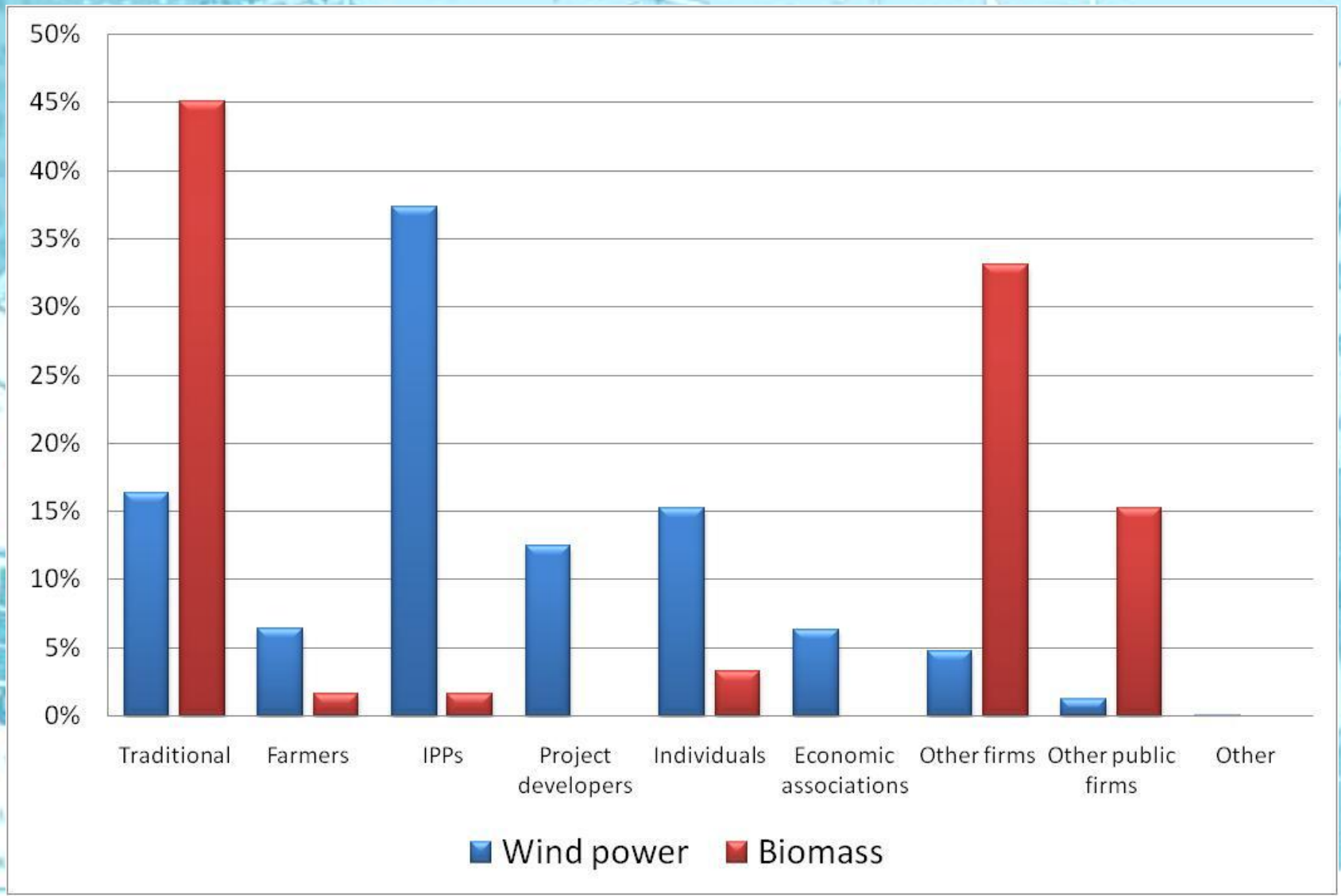


Investor categories in two time periods

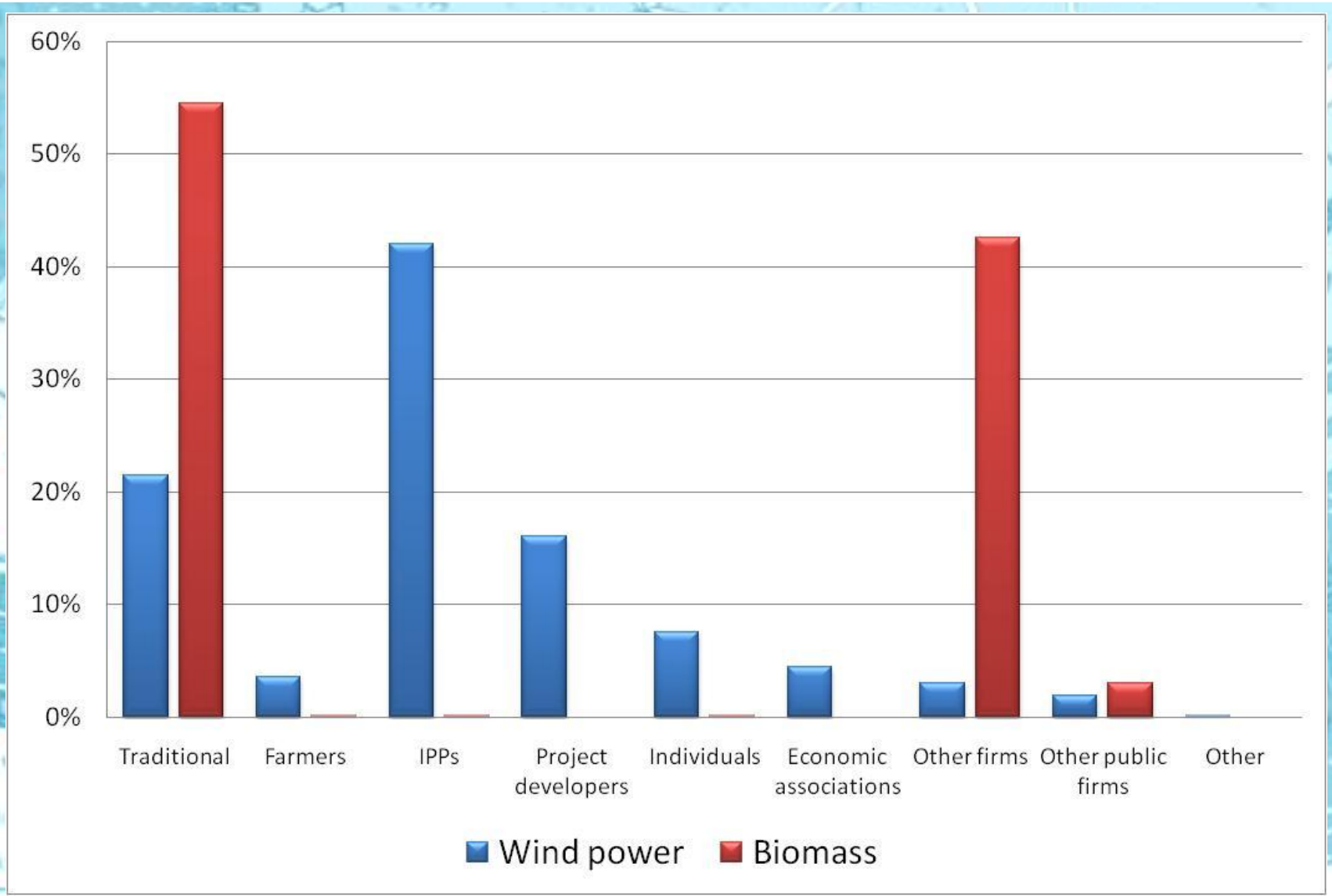
(Number of plants)



Types of investors 1990-2010
(share of number of plants)



Types of investors 1990-2010
(share of installed capacity)



Traditional investors

Wind power

- Types of companies:
  - Utilities
  - Municipal energy companies
  - Private energy companies
- Average plant size
  - 1990-2002: 0.7 MW
  - 2003-2011: 2.0 MW
  - 1990-2011: 1.7 MW

Biomass-based power

- Types of companies:
  - Utilities
  - Municipal energy companies
  - Private energy companies
- Average plant size
  - 1990-2002: 20 MW
  - 2003-2011: 23 MW
  - 1990-2011: 21 MW

Farmers, Individuals, Associations, IPPs and Project developers

Wind power

- Farmers & individuals
  - 395 plants
  - Average plant size: 0.7 MW
- Economic associations
  - 116 plants
  - Average plant size : 0.9 MW
- IPPs
  - 682 plant
  - Average plant size: 1.5 MW
- Project developers
  - 228 plants
  - Average plant size: 1.7 MW

Biomass-based power

- Farmers, individuals and IPPs
  - Very few and small (<100 kW on average) investments – primarily small biogas units in farms
- No investments by project developers

What "other firms" invest and in what?

Wind power

- Diverse set of firms
  - One (small) group of firms involved in other types of agricultural businesses than traditional farming.
- Average plants size: 0.8 MW

Biomass-based power

- Basically paper & pulp industry
  - Primarily industrial back-pressure
  - Average plant size: 25 MW
- Some waste management companies etc.
  - Primarily CHP
  - Average plant size: 22 MW

What ”other public firms” invest and in what?

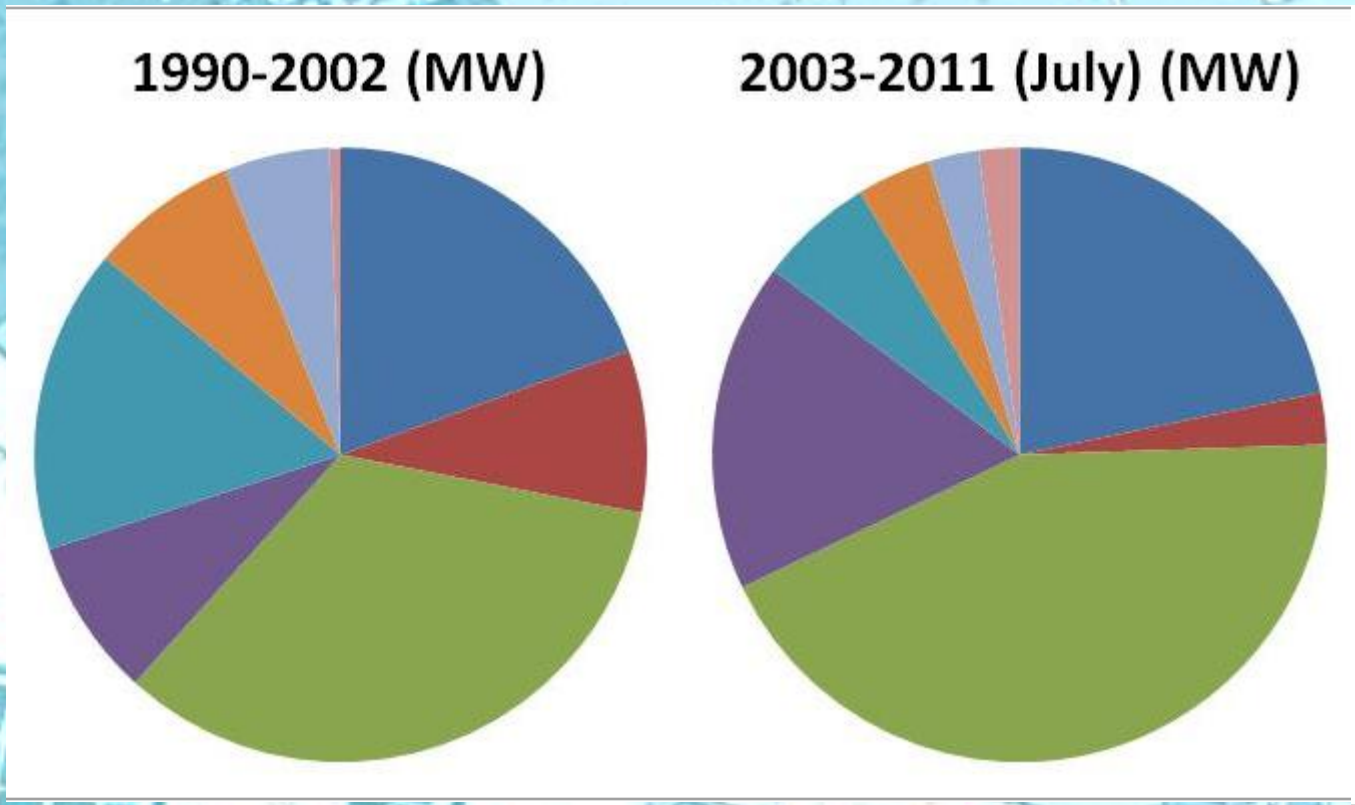
Wind power

- Primarily municipal companies
  - Real estate companies
- Some big wind parks
  - E.g. Vindpark Vänern (5 x 3 MW)
- Average plant size: 2 MW

Biomass-based power

- Primarily municipal companies:
  - Waste management companies
  - Sewage treatment works
- Types of production:
  - CHP (10 plants)
    - Average plant size: 7 MW
  - Industrial back pressure (2 plants)
    - Average plant size: 10 MW
  - Other (16 plants)
    - Primarily sewage treatment
    - Average plant size: 0.3 MW

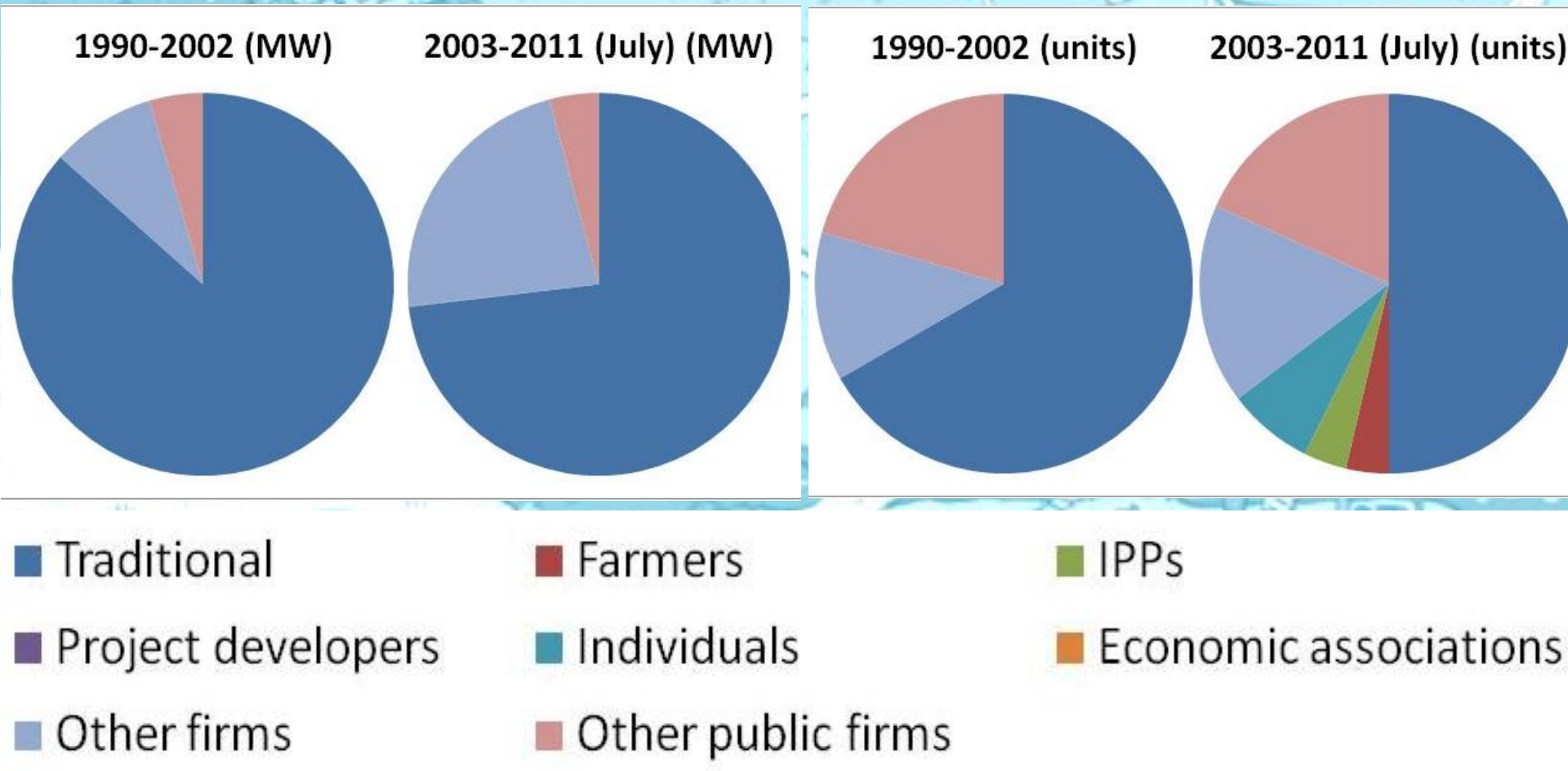
Changes in investor patterns: Wind power



Wind power average unit size (MW)

	1990-2002	2003-2011	Total
Other public firms	0.7	2.3	2.0
Traditional investors	0.7	2.2	1.7
Project developers	0.7	1.9	1.7
IPP	0.6	1.8	1.5
Economic associations	0.5	1.3	0.9
Farmers	0.5	1.0	0.7
Other firms	0.5	1.1	0.8
Individuals	0.5	0.8	0.6

Changes in investor patterns: Biomass-based power



Investor characterisation

Some preliminary results of our first interviews (primarily wind turbine owners in the county of Östergötland)

Motives

"I don't understand why people ask me why I have invested in wind power. I of course want to make money – what other reasons can there be?!"

"The river was flowing past our mill, and customers kept telling me it was a terrible waste not to use the water."

"We just handed over our farm to one of our sons and had to find a new project to keep us busy. We wanted to do something we hadn't done before and wind power seemed like a good idea."

Investment criteria (1): ROI

"We want to invest in something that is more profitable than our farming business, taking into account how many man hours we have to put in to make that profit."

"I didn't do any investment analysis. I had the capital, and the equipment supplier said that I had enough water for the turbine to pay itself back over time."

"We wanted a better ROI than the interest rate we get on the money we have on our bank account, but there are so many variables that you cannot take all of them into account. You have to use your gut feeling."

Investment criteria (2): Alternatives

"We didn't have anything else in mind, but the main thing we had to give up is to buy more land if any of the neighbouring farms comes up for sale anytime soon."

"There weren't really any alternatives. This was the next investment on my list, and I had been thinking about it for about 10 years."

"We thought about buying some forest, but that deal didn't come through. We also have some buildings, but we were kind of bored with that and wanted to do something new."

Resource mobilization

"We got a lone from the bank, but they required us to put in 20% (0.4 M€) of our own money. So we had to take out a mortgage on our farm to cover this. Most farms are too small to do this, though."

"I don't believe in loans. I wait until I have saved enough money – then I invest. I made an investment in my mill in 1998, and in 2003 I had enough money to buy a hydro power turbine."

"We had enough money to be able to negotiate a bank loan. We also invited some other people to invest in the turbine, but we kept 51% within the family to ensure control."

Technology choice

"We looked at many different suppliers, but several of these would not sell individual wind turbines. The supplier we chose had reliable turbines and also a well-developed support system in Sweden. We picked the turbine based on size – we wanted a high enough turbine to get good wind conditions ..."

"I didn't know anything about this, so I just started to look around. I contacted one supplier and he seemed to be a good guy, so I bought my turbine from him. He measured the water flow and told me what turbine I should get."

"We chose between two different suppliers. One of these had a turbine without gearbox and that seemed to be a more reliable design. Moreover, the other supplier was kind of rude on the phone and didn't want to send us a proposal for only one turbine."

What have we learnt so far?

- Very far from the archetypical investor assumed in energy economics!
- Too few interviews yet to see any patterns, but at least we know that
  - new investors differ in terms of motives & degree of business thinking;
  - existing resources – land, wind/water conditions and money – are very important for investment decisions; and
  - investment analyses are sketchy at best – investors find it difficult to make even rough estimates of electricity prices, certificate prices, euro exchange rates, wind conditions etc.

How do we proceed from here?

- More interviews with different types of investors in wind power
- Interviews with different types of investors in biopower (and perhaps hydro power)
- Survey to larger groups of investors
  - Farmers and other individuals
  - IPPs
- Separate solar cell study (investment subsidies)
  - Comparison with The Netherlands