

Results of empirical investigation / WP 2



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Survey participants by country



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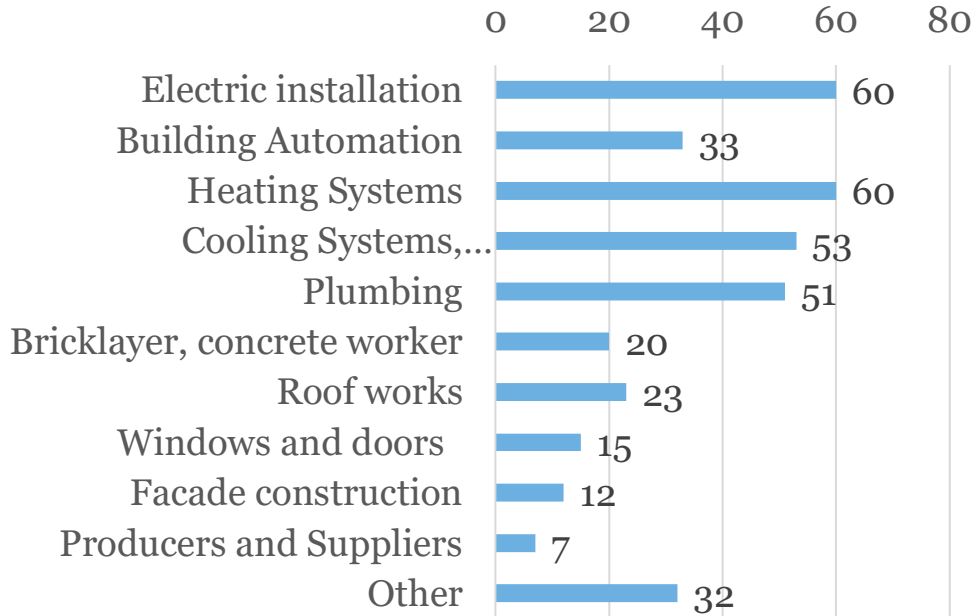
| Where is your company located | Total |
|--------------------------------------|--------------|
| Finland | 5 |
| Germany | 42 |
| Italy | 14 |
| Lithuania | 30 |
| Netherlands | 24 |
| Spain | 23 |
| Total | 138 |



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Survey participants by area of activity and multi-service



| Number of activities | Share of respondents |
|----------------------|----------------------|
| 1 | 25% |
| 2 | 24% |
| 3 | 16% |
| 4 | 9% |
| 5 | 12% |
| 6 | 1% |
| 9 | 1% |
| 10 | 1% |

17 respondents (12%) of respondents indicated that their area of activity is 'other'. 64% of respondents are working in 3 areas and every fourth (31) - only in one area. Of those, majority (18) - in electric installation

Survey participants by area and country, %



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Which specific area is your company focused on? (multiple answers were possible)

| | LT | DE | ES | IT | FI | NL |
|------------------------------|------|------|------|------|-------|------|
| Electric installation | 35,5 | 53,7 | 8,7 | 21,4 | 25,0 | 79,2 |
| Building Automation | 12,9 | 46,3 | 4,3 | 7,1 | 50,0 | 25,0 |
| Heating Systems | 22,6 | 43,9 | 73,9 | 7,1 | 100,0 | 54,2 |
| Cooling Systems, Ventilation | 12,9 | 31,7 | 73,9 | 21,4 | 75,0 | 54,2 |
| Plumbing | 25,5 | 31,7 | 43,5 | 21,4 | 100,0 | 58,3 |
| Bricklayer, concrete worker | 32,3 | 2,4 | 21,7 | 14,3 | 0,0 | 0,0 |
| Roof works | 25,8 | 9,8 | 17,4 | 28,6 | 0,0 | 12,5 |
| Windows and doors | 22,6 | 2,4 | 17,4 | 21,4 | 0,0 | 0,0 |
| Facade construction | 25,8 | 2,4 | 4,3 | 21,4 | 0,0 | 0,0 |
| Producers and Suppliers | 12,9 | 2,4 | 4,3 | 0,0 | 0,0 | 4,2 |
| Other | 29,0 | 17,1 | 21,7 | 57,1 | 0,0 | 16,7 |

Profile of activities of respondents in different countries is very diverse



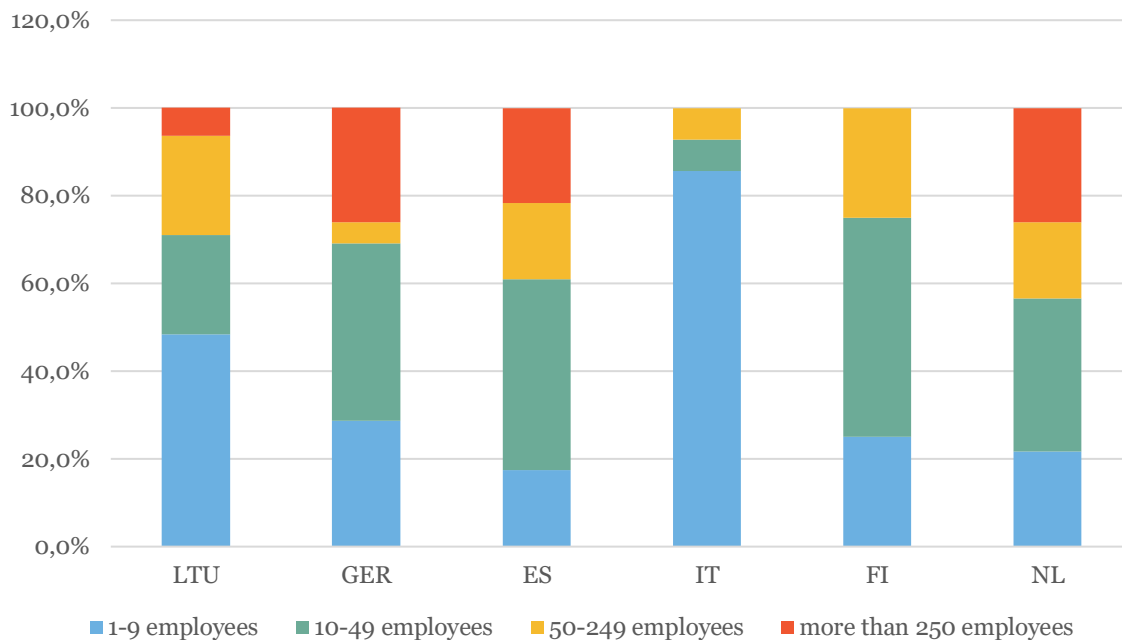
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Survey participants by company size



- 1-9 employees
- 10-49 employees
- 50-249 employees
- more than 250 employees
- no answer



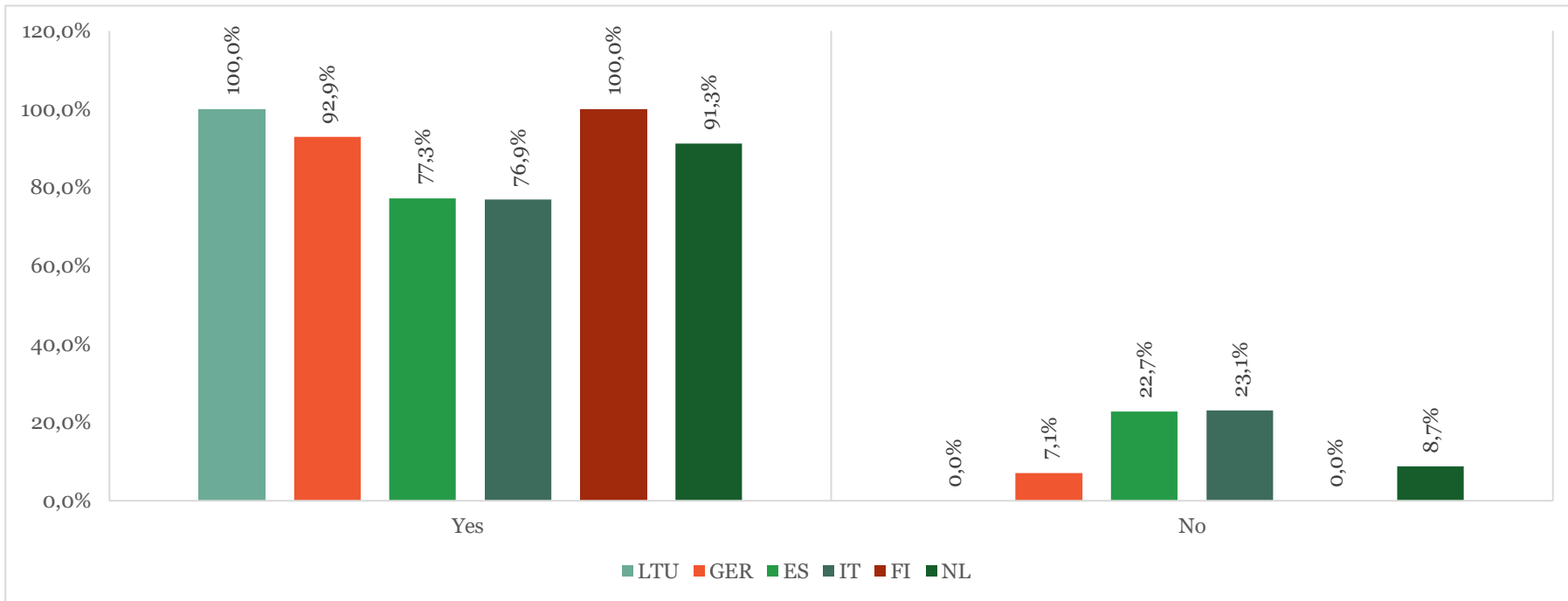
Micro and small company respondents dominate

Does your company network and collaborate with other trades on the construction site while providing building services?



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Collaboration with other trades seems to be a principle of activity



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If yes, with which trades do you work closely? (multiple answers are possible)

| | Total | LT | DE | ES | IT | FI | NL |
|------------------------------|-------|-----|-----|-----|-----|-----|-----|
| Electric installation | 56% | 61% | 68% | 61% | 75% | 75% | 48% |
| Heating Systems | 53% | 61% | 65% | 61% | 58% | 75% | 48% |
| Cooling Systems, Ventilation | 46% | 48% | 53% | 56% | 58% | 75% | 33% |
| Plumbing | 44% | 61% | 38% | 83% | 50% | 75% | 33% |
| Producers and Suppliers | 42% | 61% | 53% | 28% | 42% | 0% | 43% |
| Roof works | 32% | 42% | 40% | 17% | 58% | 50% | 29% |
| Building Automation | 31% | 32% | 35% | 33% | 25% | 50% | 43% |
| Bricklayer, concrete worker | 31% | 42% | 35% | 33% | 50% | 25% | 19% |
| Windows and doors | 25% | 42% | 28% | 17% | 58% | 0% | 10% |
| Facade construction | 22% | 39% | 18% | 28% | 33% | 0% | 14% |
| Other | 22% | 16% | 23% | 28% | 50% | 0% | 33% |

Electrical installation, Heating systems, Cooling systems, ventilation and Plumbing are 4 trades with which the cooperation of respondents is the most intensive

Networking and collaboration with other trades by the trade of respondents (Which trades (Q1.2) primarily work together with which other trades in practice (reference to question 2 / part 2)?), %, >50%



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| Trade | Electric installation, % | Building Automation, % | Heating Systems, % | Cooling Systems, Ventilation, % | Plumbing, % | Bricklayer, concrete worker, % | Roof works, % | Windows and doors, % | Facade construction, % | Producers and Suppliers, %s | Other, % |
|------------------------------|--------------------------|------------------------|--------------------|---------------------------------|-------------|--------------------------------|---------------|----------------------|------------------------|-----------------------------|----------|
| Electric installation | | 36 | 57 | 45 | 38 | 29 | 33 | 24 | 19 | 43 | 22 |
| Building Automation | 58 | | 76 | 73 | 52 | 33 | 36 | 33 | 24 | 45 | 15 |
| Heating Systems | 60 | 37 | | 42 | 48 | 30 | 27 | 18 | 22 | 42 | 17 |
| Cooling Systems, Ventilation | 57 | 43 | 45 | | 45 | 32 | 30 | 21 | 23 | 42 | 19 |
| Plumbing | 69 | 35 | 51 | 45 | | 39 | 35 | 22 | 25 | 45 | 22 |
| Bricklayer, concrete worker | 80 | 55 | 65 | 65 | 80 | | 50 | 40 | 50 | 35 | 25 |
| Roof works | 78 | 43 | 65 | 57 | 61 | 39 | | 39 | 48 | 65 | 22 |
| Windows and doors | 80 | 40 | 67 | 60 | 73 | 40 | 47 | | 40 | 47 | 27 |
| Facade construction | 83 | 50 | 67 | 75 | 75 | 67 | 58 | 58 | | 58 | 25 |
| Producers and Suppliers | 57 | 43 | 43 | 43 | 43 | 57 | 43 | 43 | 43 | | 43 |
| Other | 59 | 31 | 63 | 50 | 47 | 34 | 34 | 38 | 22 | 44 | |

Assessment of statements about importance of interdisciplinary and cross-disciplinary competences for employers (Q2.5. How important are the following interdisciplinary and cross-trade competences for your employees), N=138



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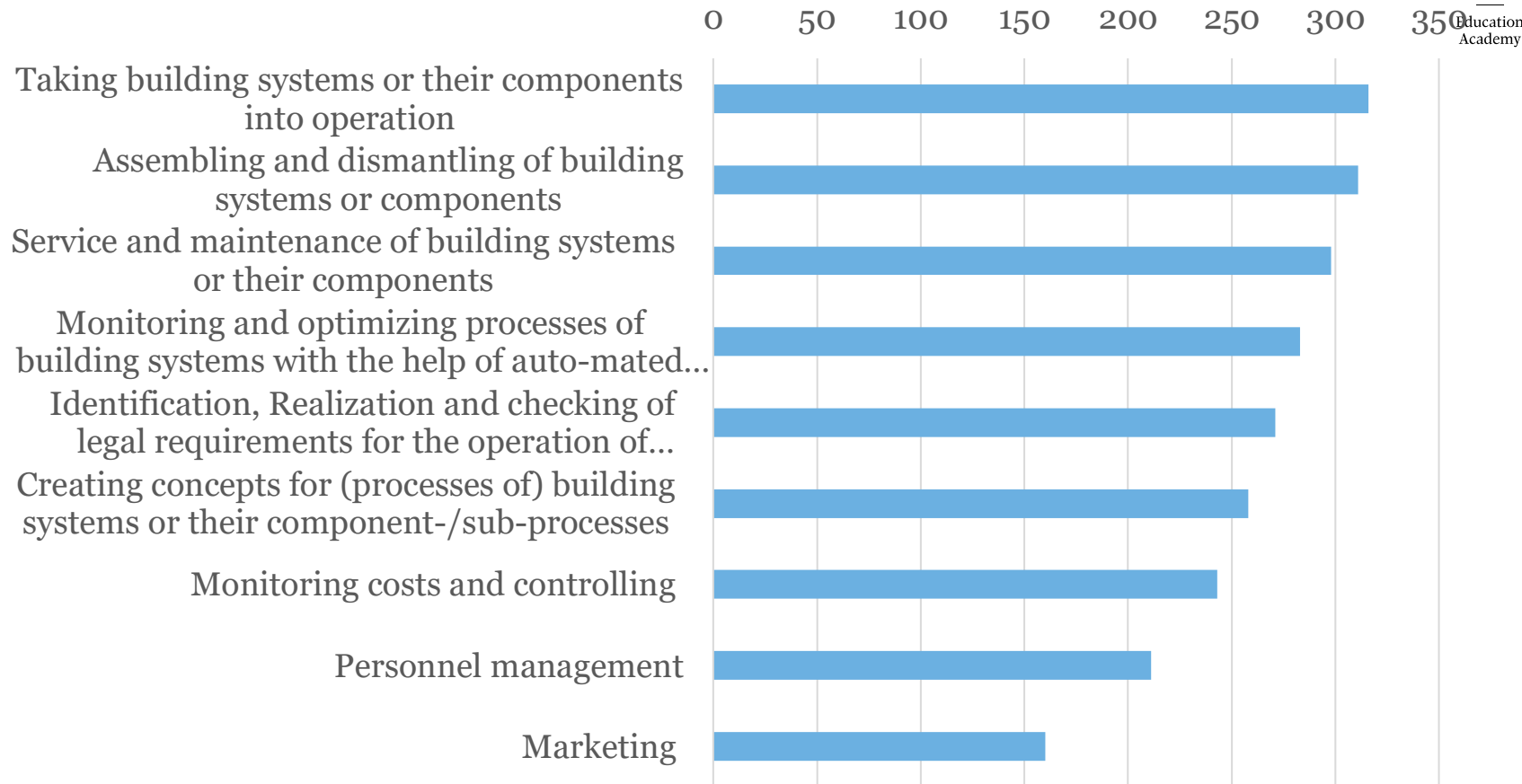
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| Statement | No of respondents | | | | |
|---|-------------------|-----------------------------------|-------------|------------|-----------|
| | Important | Neither important nor unimportant | Unimportant | Don't know | No answer |
| The ability to recognize and understand relationships between different Trades | 107 | 22 | 2 | 3 | 4 |
| The ability to solve problems systematically in complex systems | 124 | 7 | 2 | 1 | 4 |
| A basic knowledge on different technical systems in a building and their interconnection | 113 | 14 | 3 | 2 | 6 |
| Understanding multiple disciplines including engineering, computer science, electronics and control systems | 77 | 46 | 7 | 3 | 5 |
| Combining expertise in different trades to implement innovation | 90 | 35 | 5 | 2 | 6 |
| The ability to integrate and automate various building systems | 80 | 40 | 8 | 4 | 6 |
| The ability to identify, analyse and resolve complex technical tasks | 103 | 25 | 4 | 2 | 4 |
| The ability to collect, analyze and interpret data from various sensors to optimize building performance | 83 | 36 | 7 | 6 | 6 |
| The ability to communicate and collaborate with employees from other trades | 117 | 13 | 1 | 2 | 5 |

Which occupational action situations were selected most frequently?

| Occupational action situations | Yes |
|--|-----|
| Installation of a heat pump or a hybrid heating system | 67 |
| Installation of solar thermal systems | 55 |
| Installation of solar cooling systems | 32 |
| Installation of a photovoltaic system | 67 |
| Installation and commissioning of sensors and actuators for the automation of building processes | 72 |
| Troubleshooting in building systems and building installations | 88 |

Which core work processes / competence areas were selected most frequently as the most important?



Which core work processes were particularly important or unimportant for the companies for which the action situation was relevant?



| No. | Core work process/competence area/ | Professional situation | | | | |
|-----|--|---|-----------------------------------|-------------|------------|-------------|
| | | 1. Installation of a heatpump or a hybrid heating system (heatpump with fossil heat generator) (N=67) | | | | |
| | | Important | Neither important nor unimportant | Unimportant | Don't know | No response |
| 1. | Assembling and dismantling of building systems or components | 55 | 6 | 1 | 3 | 2 |
| 2. | Service and maintenance of building systems or their components | 54 | 6 | 2 | 3 | 2 |
| 3. | Taking building systems or their components into operation | 59 | 3 | 1 | 2 | 2 |
| 4. | Monitoring and optimizing processes of building systems with the help of automated installations and components | 48 | 10 | 2 | 5 | 2 |
| 5. | Creating concepts for (processes of) building systems or their component-/sub-processes | 41 | 18 | 1 | 5 | 2 |
| 6. | Identification, Realization and checking of legal requirements for the operation of building systems (operator responsibility) | 50 | 9 | 2 | 4 | 2 |
| 7. | Monitoring costs and controlling | 44 | 18 | 1 | 2 | 2 |
| 8. | Marketing | 26 | 22 | 14 | 2 | 3 |
| 9. | Personnel management | 34 | 21 | 6 | 4 | 2 |

Which core work processes were particularly important or unimportant for the companies for which the action situation was relevant?



| No. | Core work process/competence area/ | Professional situation | | | | |
|-----|--|--|-----------------------------------|-------------|------------|-------------|
| | | 2. Installation of solar thermal systems on the roofs of buildings | | | | |
| | | Important | Neither important nor unimportant | Unimportant | Don't know | No response |
| 1. | Assembling and dismantling of building systems or components | 43 | 7 | | 2 | 3 |
| 2. | Service and maintenance of building systems or their components | 40 | 9 | 2 | 2 | 2 |
| 3. | Taking building systems or their components into operation | 43 | 7 | 1 | 2 | 2 |
| 4. | Monitoring and optimizing processes of building systems with the help of auto-mated installations and components | 39 | 8 | 2 | 3 | 3 |
| 5. | Creating concepts for (processes of) building systems or their component-/sub-processes | 34 | 11 | 3 | 4 | 3 |
| 6. | Identification, Realization and checking of legal requirements for the operation of building systems (operator responsibility) | 37 | 9 | 2 | 4 | 3 |
| 7. | Monitoring costs and controlling | 33 | 14 | 4 | 2 | 2 |
| 8. | Marketing | 25 | 21 | 3 | 4 | 2 |
| 9. | Personnel management | 30 | 18 | 2 | 3 | 2 |

Which core work processes were particularly important or unimportant for the companies for which the action situation was relevant?



| N o. | Core work process/competence area/ | Professional situation | | | | |
|---------|--|---|--------------------------------------|-------------|------------|----------------|
| | | 3. Installation of a solar cooling system on the roof of a building | | | | |
| | | Important | Neither important nor unimportant | Unimportant | Don't know | No response |
| 1. | Assembling and dismantling of building systems or components | 22 | 5 | | 4 | 1 |
| 2. | Service and maintenance of building systems or their components | 24 | 2 | 1 | 4 | 1 |
| 3. | Taking building systems or their components into operation | 25 | 2 | 1 | 3 | 1 |
| 4. | Monitoring and optimizing processes of building systems with the help of automated installations and components | 23 | 3 | 1 | 4 | 1 |
| 5. | Creating concepts for (processes of) building systems or their component-/sub-processes | 21 | 5 | 1 | 4 | 1 |
| 6. | Identification, Realization and checking of legal requirements for the operation of building systems (operator responsibility) | 22 | 4 | 1 | 3 | 2 |
| 7. | Monitoring costs and controlling | 19 | 8 | 1 | 3 | 1 |
| 8. | Marketing | 12 | 11 | 4 | 4 | 1 |
| 9. | Personnel management | 16 | 8 | 3 | 4 | 1 |

Which core work processes were particularly important or unimportant for the companies for which the action situation was relevant?



| No. | Core work process/competence area/ | Professional situation | | | | |
|-----|--|--|-----------------------------------|-------------|------------|-------------|
| | | 4. Installation of a photovoltaic system on the roof of a residential or commercial building | | | | |
| | | Important | Neither important nor unimportant | Unimportant | Don't know | No response |
| 1. | Assembling and dismantling of building systems or components | 58 | 5 | 1 | 1 | 2 |
| 2. | Service and maintenance of building systems or their components | 52 | 7 | 4 | 2 | 2 |
| 3. | Taking building systems or their components into operation | 59 | 3 | 2 | 1 | 2 |
| 4. | Monitoring and optimizing processes of building systems with the help of auto-mated installations and components | 51 | 8 | 3 | 3 | 2 |
| 5. | Creating concepts for (processes of) building systems or their component-/sub-processes | 49 | 9 | 4 | 3 | 2 |
| 6. | Identification, Realization and checking of legal requirements for the operation of building systems (operator responsibility) | 50 | 8 | 4 | 3 | 2 |
| 7. | Monitoring costs and controlling | 45 | 15 | 3 | 2 | 2 |
| 8. | Marketing | 28 | 21 | 12 | 4 | 2 |
| 9. | Personnel management | 40 | 15 | 6 | 3 | 3 |

Which core work processes were particularly important or unimportant for the companies for which the action situation was relevant?



| No. | Core work process/competence area/ | Professional situation | | | | |
|-----|--|------------------------|-----------------------------------|-------------|------------|-------------|
| | | 5. Building automation | | | | |
| | | Important | Neither important nor unimportant | Unimportant | Don't know | No response |
| 1. | Assembling and dismantling of building systems or components | 60 | 7 | | 2 | 3 |
| 2. | Service and maintenance of building systems or their components | 55 | 9 | 1 | 3 | 4 |
| 3. | Taking building systems or their components into operation | 58 | 7 | 2 | 2 | 3 |
| 4. | Monitoring and optimizing processes of building systems with the help of automated installations and components | 56 | 8 | 2 | 2 | 4 |
| 5. | Creating concepts for (processes of) building systems or their component-/sub-processes | 53 | 12 | 1 | 2 | 4 |
| 6. | Identification, Realization and checking of legal requirements for the operation of building systems (operator responsibility) | 50 | 15 | 2 | 2 | 3 |
| 7. | Monitoring costs and controlling | 46 | 21 | 1 | 1 | 3 |
| 8. | Marketing | 33 | 24 | 9 | 3 | 3 |
| 9. | Personnel management | 39 | 22 | 4 | 4 | 3 |

Which core work processes were particularly important or unimportant for the companies for which the action situation was relevant?



| No. | Core work process/competence area/ | Professional situation | | | | |
|-----|--|---|-----------------------------------|-------------|------------|-------------|
| | | 6. Troubleshooting in building systems and building installations | | | | |
| | | Important | Neither important nor unimportant | Unimportant | Don't know | No response |
| 1. | Assembling and dismantling of building systems or components | 73 | 8 | 3 | 1 | 3 |
| 2. | Service and maintenance of building systems or their components | 73 | 8 | 3 | 1 | 3 |
| 3. | Taking building systems or their components into operation | 72 | 8 | 4 | 1 | 3 |
| 4. | Monitoring and optimizing processes of building systems with the help of automated installations and components | 66 | 12 | 4 | 2 | 4 |
| 5. | Creating concepts for (processes of) building systems or their component-/sub-processes | 60 | 17 | 5 | 2 | 4 |
| 6. | Identification, Realization and checking of legal requirements for the operation of building systems (operator responsibility) | 62 | 15 | 5 | 3 | 3 |
| 7. | Monitoring costs and controlling | 56 | 22 | 4 | 3 | 3 |
| 8. | Marketing | 36 | 30 | 13 | 6 | 3 |
| 9. | Personnel management | 52 | 23 | 6 | 3 | 4 |

Different occupations vs. one profession with multidisciplinary knowledge

| Professional situation | Repondents, total | Need people from different professions to perform this professional situation | This can be performed by one profession with multidisciplinary knowledge |
|--|-------------------|---|--|
| Installation of a heat pump or a hybrid heating system | 67 | 66% | 57% |
| Installation of solar thermal systems | 55 | 60% | 51% |
| Installation of solar cooling systems | 32 | 81% | 50% |
| Installation of a photovoltaic system | 67 | 64% | 58% |
| Installation and commissioning of sensors and actuators for the automation of building processes | 72 | 57% | 64% |
| Troubleshooting in building systems and building installations | 88 | 60% | 58% |

Conclusions



- The survey confirms that **technical skills and operational knowledge** in building engineering services is still relevant. Professionals need to proficiency in such tasks as assembling, dismantling, servicing, maintaining, and operating building systems or their components to ensure functionality and sustainability through effective maintenance and troubleshooting.
- The survey confirmed the industry's shift towards **automation, renewable energy integration, and advanced building technologies** and strong demand for professionals with specialized knowledge and skills in these areas.
- Considering a diverse profile of companies activities and diverse range of professional situations, building engineering technicians need to be versatile and responsive to these varied demands, requiring a broad skill set that encompasses not only technical expertise but also and foremost transversal skills, such as **adaptability and problem-solving abilities**.
- The survey identifies **marketing as one of the least relevant processes** across different professional situations. This suggests that within the context of building engineering services, practical skills related to system operation, maintenance, and installation are prioritized over marketing and promotional activities. Professionals in this field are primarily focused on technical execution and service delivery.
- There was no clear consensus among survey participants regarding whether certain professional situations require collaboration across different professions **or can be handled by a single profession with multidisciplinary knowledge**.



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